The
Electrical Review

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Outdoor Illumination

RECENT discussions in the Press and elsewhere regarding the safety of our streets have paid too little attention to the importance of adequate lighting. By adequate lighting we mean not only a high enough intensity but also a proper distribution over the illuminated plane.

What is officially termed "public lighting" requires about 200 million kWh per annum; this is only about 2 per cent. of the kWh sold for all purposes, but its publicity value is out of all proportion to the revenue received. The gas people fully realise this; hence the keenness of their competition in a field in which some of the objections to gas (such as excessive local heating, fumes and discoloration of surfaces) do not apply, and every victory scored by electricity is on one of its rival's strongest grounds. Given a fair field and no favour, we are in no doubt as to the ultimate issue, having regard to recent developments in electric lamps and fittings.

There is also another aspect in the general assistance received from signs and exterior lighting decorative schemes, including both white and coloured floodlighting, the latter of which can now be done efficiently with the electric discharge lamp owing to the elimination of colour screens. Many towns, not all by the sea, are emulating the successful efforts of Blackpool and Southend to attract visitors, while the floodlighting of Battersea power station provides a noble example of what can be done in that way. Two months hence an opportunity will be given everywhere to show what light can do on the occasion of the royal wedding. Such adventitious aids to public lighting, although strictly limited in their scope, add considerably to the amount of energy consumed for outdoor illumination.

At last year's conference of the Association of Public Lighting engineers at Margate the discharge lamp was the chief subject of interest. Since then its spectrum has been improved and it can now be operated horizontally; there is also the coiled-coil filament lamp for small luminous outputs, but so far this has not been applied to public lighting.

To make the most of the discharge lamp properly designed directional fittings are essential. Perhaps the most striking feature of the exhibition at Aberdeen last week was the large number of well-known manufacturers displaying fittings designed especially for use with this type of lamp, thus indicating their confidence in its future as well as their ability to adapt their methods to changing technique.

With the advent of the 250-W high-pressure mercury-vapour lamp we have all the material we need for making our streets as safe as good lighting can make them. The manner of the use of this material is defined in a British Standard Specification; but who is to settle the grading of the roads or to see that the minimum conditions are fulfilled?

This subject presses for investigation by the Ministry of Transport, and we would suggest to Mr. Hore-Belisha that he can here find a means for reconciling the interests of two sections of his department—the safety of the roads through adequate illumination.

National Convention Next June

WE are glad to report that a definite decision was reached last week to hold a National Electrical Convention at Folkestone in the week commencing June 17th, 1935. We publish an official announcement on page 408 of this issue. It will be observed that it is being organised jointly by municipal and company electricity supply interests, the Electrical Development Association and the electrical contractors. The women's electrical organisation, the manufacturers, the I.E.E., the wholesalers, the Central Board, the Commissioners, and other Government departments will be represented. The President of the I.M.E.A. for the year, Mr. E. E. Hoadley, of Maidstone, will be president of the Convention, and Mr. J. W. Simpson, secretary of the I.M.E.A., will be responsible for the secretarial duties. Concurrently with the meetings there will be an electrical exhibition in the Marine Gardens at Folkestone. We congratulate the electricity supply industry as well as the

I.M.E.A. and the co-opted representatives of power companies, contractors, and others, upon the fact that the great event so often argued for in these pages is at last within sight. The objects in view are manifold, but they all have it as their ultimate aim, as the official announcement states, to give "a great impetus to the electricity supply industry." For very many years there have been those amongst us who have longed to see the breaking down of barriers between municipal and company undertakings if only for the purpose of facilitating discussion of matters of common interest. During the last year or two the atmosphere has become more congenial for fraternisation as parochial electricity supply views have become less fashionable and national interests have demanded consideration.

After Many Days

IN June next all parties, including the contractors, will meet together as they have never done before, and we anticipate that great things will follow for the industry. The original suggestion for such a gathering here dates back to over twenty years ago, when British supply men observed the great success that attended the big annual conventions of the now superseded National Electric Light Association in America. It was advocated in these pages in the early days of the I.M.E.A., because company supply men of standing were naturally shut out from membership by reason of the constitution of the Association. We believe we are right in saying that later Mr. Beauchamp laid the matter before the E.D.A., while more recently, as our readers know, Mr. A. E. Jennings, of Birmingham, has been one of its foremost and most persistent advocates. These things matter little, however, now that the idea is to be carried into effect. One of the greatest ends that we hope to see achieved is the growth of a greater friendliness and co-operation between all interested in electrical expansion.

Cunarder 534

THE great amount of public notice given to the Cunard-White Star liner 534, which was launched on Wednesday, should be good for the development of electricity for marine purposes, owing to the lengths to which electrification has been carried. In one Press report it was stated that everything in the ship will be electric, but that is to overlook the use of a direct steam drive for propulsion. The new Cunarder does not fall into the category of all-electric ships, of which there are now considerably more than 200 (not about 100 as stated recently in a daily paper). One of these is the *Monarch of Bermuda*, which found the ability to obtain full power astern quickly (instead of the 70 per cent. possible with an independent turbine direct drive) very useful when standing by the *Morro Castle*, also electrically propelled. In addition to propulsion, another electrical feature of future liners may be the use of welded instead of riveted construction; there are said to be ten million rivets in the hull of 534.

Coming Events

THE I.E.E. session opens on October 25th (a week later than usual) with Professor W. M. Thornton's presidential address. Thereafter, for the remainder of the year, ordinary meetings will follow fortnightly, the first paper being on British hydro-electric developments, by Messrs. A. E. Valentine and E. M. Bergstrom. It is some time since we had anything on electricity in marine use, and recent developments will make the contribution of Messrs. C. W. Saunders and H. W. Wilson and Dr. Jakeman especially topical. The information available regarding electrical warming and water-heating in large buildings is still not nearly as complete as it might be, and we welcome the paper to be given by Messrs. R. Grierson and D. Betts. A new note will be struck by the account of the organisation of electricity supply in New Zealand, which has been prepared by Mr. F. T. M. Kissel. The first event of the new year will be the paper by Mr. A. Monkhouse on electricity in the U.S.S.R., which was postponed from last session. Our Forthcoming Events Section this week indicates that many of the various associations representing electrical and allied interests are springing once more to active life with the opening of October.

Mr. Ferranti's Review

MR. VINCENT Z. DE FERRANTI, in reviewing the operations of his company, to whose financial results we referred last week, gave a brief indication of what is happening in certain lines of manufacture in which it has latterly been specialising. In the radio and fire departments seasonal activities for 1934-5 commenced earlier, and on a larger scale, than a year ago. It is interesting to read his belief that the public are becoming more electric-clock-minded and to know that recent designs of synchronous electric clocks are being well received. Mr. Ferranti does not anticipate that radio prices will go lower than they are now, unless some radical invention in design appreciably cheapens manufacturing costs. The present comparative stability of broadcasting conditions allows manufacturers to concentrate upon improving the quality of reproduction rather than devoting their energies more and more to such matters as selectivity and range of reception.

Further Extensions at Brighton

IN commenting on the official starting up of the new 30,000-kW set at Southwick Power Station in our issue of September 14th we referred to plans in hand for increasing the installed capacity to 100,000 kW. The Electricity Committee has now been notified that a further 30,000-kW turbo-alternator and a 150,000-lb. per hr. boiler should be installed, the estimated cost being £185,000. This extension forms part of the programme of the Central Electricity Board for extending selected stations by some 500,000 kW to which we referred on July 15th and 27th. The total value of the orders will amount to nearly £5,000,000.

London Evening Classes

THAT the London County Council should arrange a course of evening lectures on electricity supply accounts and practice at the Coopers' Company's School at Mile End may be regarded as a sign of the times and an indication of increasing interest in commercial electricity matters. We can quite imagine that some young men and women who have become more or less fed up with somewhat general talks on mere salesmanship will avail themselves with zest of an opportunity for studying in class such matters as electricity supply tariffs, hire purchase, assisted wiring, bulk supply, the Commissioners' and the Board's statistical returns, the powers of supply authorities, and so on. The course commenced on Monday last, when the L.C.C. also opened its electrical engineering classes at Poplar, Lewisham, Hackney and Paddington.

The Electrical Talkies

THOSE who are anxious to develop the gift of convincing speech whether in their own personal interests or to help forward the general electrical development movement, will learn with interest that a Public-Speaking Competition is being organised by E.D.A. for the 1934-35 season. The Council feels justified by the appreciation of the first and second contests in arranging for a third. Entry forms are obtainable on application to the Director, Mr. A. C. Cramb, at 2, Savoy Hill, London, W.C.2. A "Book of Rules" has also been prepared from which all necessary information may be gained by the large number of intending competitors (who must be under the age of thirty) who wish to sharpen both their wits and their electrical weapons. The chosen subjects are: electric service in small dwellings; the importance of electricity in industrial development; and the cheapness of electricity if the right rate is selected. We hope this campaign will have a very enthusiastic send-of and that Mr. Cramb's post-bag will contain many applications.

1. The high
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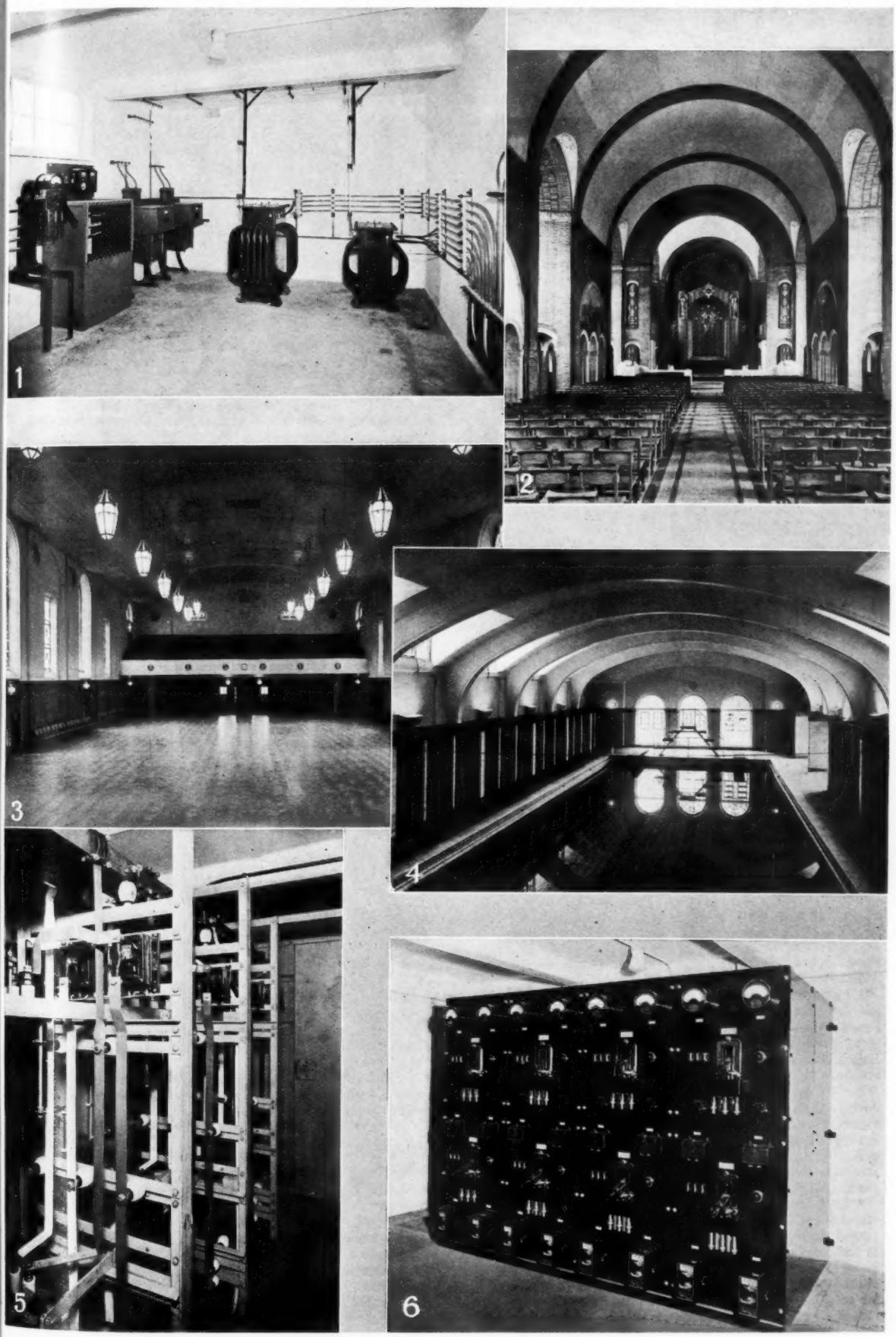


The Masonic Girls' High School at Rickmansworth. **(See page 399)**

1. The high-voltage transformer chamber in the sub-station. 2. A view of the chapel interior, which is lighted by flush wall panels. 3. The main assembly hall, looking from the stage towards the gallery. 4. The swimming pool, lighted by indirect wall troughs. 5 & 6. Rear and front views of the main distribution switchboard, with circuit-breaker control in place of fuses

Contractors and the Commissioners' Regulations

By F. Peake Sexton, A.R.C.S., A.M.I.E.E.

THE "Electricity Supply Regulations, 1934," is a twenty-six page pamphlet issued by the Electricity Commissioners and published by H.M. Stationery Office at 6d. These Regulations affect a very large part of the electrical industry, but we are here only concerned with those sections that directly touch the electrical installation engineer, more frequently referred to as a contractor or a wireman.

Some contractors have been advised by the supply men to buy a copy, advice that is seldom followed for few contractors have the time or the inclination to wade through twenty-six pages of legal matter which is hardly palatable to the commercial engineer. Also, there is so much that is of practically no use for installation work in this pamphlet. My purpose in this article is to bring out and explain concisely those sections that concern the installation engineer. The sequence of the Regulations has been followed, and a ready reference can be made to the original if required.

Over three pages in the pamphlet are occupied by definitions, but there is only one point of special interest, namely, that the definition of low pressure differs from that in the I.E.E. Regulations in not defining the limits of extra low pressure, while still giving the same upper limit of 250 V.

The Regulations came into force on January 15th, 1934, as regards any installations connected after that date. For existing installations they will come into force on January 1st, 1935.

The undertaker must not permanently connect an installation if the leakage exceeds 1/10,000 part of the maximum current. This is the same as the old Board of Trade rule, and on a 2-kW 230-V installation is equal to an insulation resistance of 253,000 ohms, that is, approximately ¼ megohm.

All apparatus must be of sufficient capacity and installed to prevent danger. Every circuit must be fused. A motor must be controlled by a suitably placed switch, but if the installation complies with the I.E.E. Regulations that is sufficient. These Regulations do not apply where the Home Office Regulations are in force.

Both sides of a three-wire installation shall not be introduced unless the total load exceeds 15 kW. Here, again, it is expressly stated that compliance with the I.E.E. Regulations is sufficient except as far as the H.O. Regulations apply.

The undertakers are given power to refuse connection at medium pressure to any defective work, but work that complies with the I.E.E. Regulations will be satisfactory.

A high-pressure supply can be given only if the h.p. lines are inaccessible to the consumer or if he has an authorised person in charge. This is followed by many instructions as to the precautions that should be taken, but high-pressure installations are outside the general run of contracting.

The undertakers are not to be compelled to give a supply for transformation to a higher voltage for the purpose of exterior luminous-type signs unless: (a) Switches are provided both internal and external (in convenient places) for its control; (b) all metalwork is protected from accidental reach or is efficiently earthed; (c) all windings of high voltage apparatus are adequately protected; (d) arrangements are made for protecting the low-voltage winding from leakage from the high-voltage side. The rules suggest earthing, but in cases like this earthing should *not* be carried out without consultation with, and authority from, the undertakers; (e) arrangements are made for making the whole or parts "dead" for cleaning or repair. The last clause again states that compliance with the Regulations of the I.E.E. shall be sufficient.

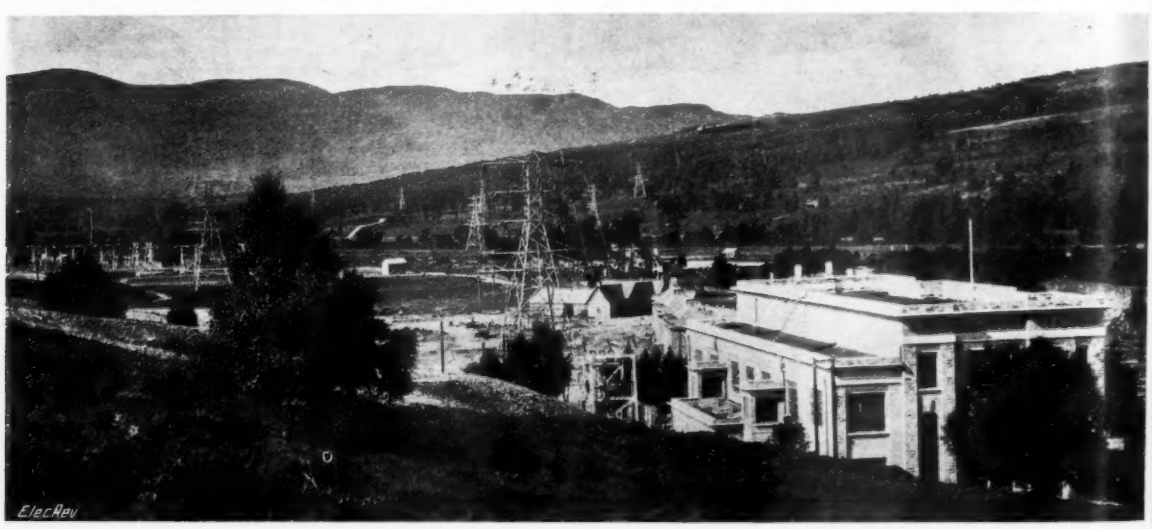
If there is a leakage on the consumer's installation such as may be against the interests of the public safety or such as may affect the efficiency of the supply, the undertakers may immediately disconnect the supply or serve notice in writing requiring the remedy of the fault, according to its nature and seriousness. This section gives the undertakers power to demand permission to test and inspect between the hours of 9 a.m. and 6 p.m.

If the undertakers refuse to connect or to reconnect they must serve the consumer with a notice in writing giving their reasons. Any dispute shall be determined by an electrical inspector appointed by the Electricity Commissioners, but an appeal may be made to the Commissioners, whose decision is final.

The voltage shall be kept within ±6 per cent. of the declared pressure. The frequency of a.c. supplies shall be maintained within ±2½ per cent. of the normal.

The undertakers must maintain a full supply, without change of polarity for d.c., or without change of neutral for a.c., unless consent has been given by the Electricity Commissioners to the change.

Notice of any discontinuance of supply, except in emergency, must be given twenty-four hours previously. If any consumer objects to such a discontinuance, the supply must be maintained until the consent of the Electricity Commissioners has been obtained to the stoppage.



The new power station of the Grampian Electricity Co. at Tummel Bridge, Perthshire

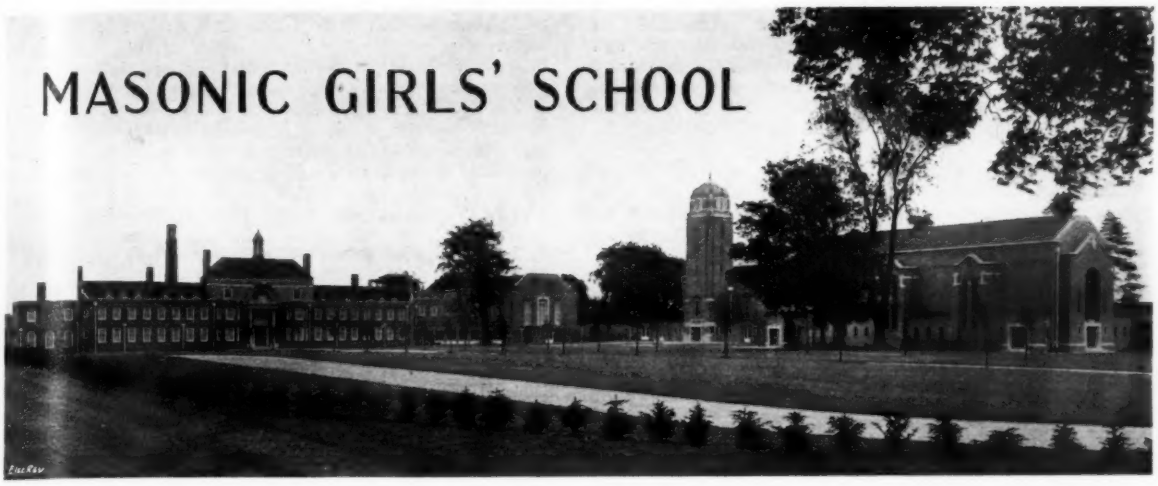
The Regulations clear up the controversial point as to whether a supply company has power to make wiring rules. In Regulation 27 the undertakers are given very wide powers, although it is even here stated that compliance with the I.E.E. Regulations is sufficient. The position is now that the undertakers have power to make rules, but that these must not be more stringent than the I.E.E. Regulations.

It may be asked why the new Regulations are needed if in all cases the I.E.E. Regulations are sufficient. The important point is that up to the issue of the Electricity Supply Regulations, 1934, there was no power to enforce the I.E.E. rules; now these are adopted and made legally binding.

"Authorised Person" Defined

The meaning of the term "authorised person" which occurs in Section 30 is defined in the H.O. Regulations as (a) the occupier, or (b) a contractor for the time being under contract with the occupier, or (c) a person employed, appointed, or selected by the occupier, or by a contractor as aforesaid, to carry out certain duties incidental to the generation, transformation, distribution, or use of electrical energy, such occupier, contractor or person being a person who is competent for the purposes of the Regulation in which the term is used." No age is given in this case, but another Regulation says that a competent person acting under an authorised person must be over twenty-one years of age.

MASONIC GIRLS' SCHOOL



THE Royal Masonic Institution for Girls was founded in 1788, probably the first organised attempt at Masonic benevolence in this or any other country. The school moved from its first site near what is now St. Pancras to St. George's Fields, and after fifty-five years there found its third home at Clapham, where it remained for eighty years until a new junior school at Weybridge, in Surrey, was completed in 1918, and in June last H.M. the Queen opened the new senior school at Rickmansworth, in Hertfordshire.

In their designs the architects, Messrs. J. L. Denman and Son, have taken full advantage of the eminent suitability of the site and the natural beauty of its rural surroundings. The group of imposing buildings stands in a well-wooded park of some 300 acres overlooking the River Chess valley.

The eight school houses, each accommodating fifty girls and attendant staff, are arranged in a semi-circle enclosing a five-acre garth. Across the points of the crescent so formed is a long building containing eighteen classrooms on one level with science laboratories and art rooms above. Projecting at right angles from the centre is a large assembly hall with a massive clock tower at the entrance end, flanked on each side by a beautiful chapel and a lofty dining hall opposite. The two quadrangles so formed are closed on one side by music rooms divided into forty cubicles, and on the other by a large indoor swimming pool with an adjoining gymnasium. At right angles to the whole is a long administrative block with an imposing frontage, behind which are hidden the staff dining rooms, kitchens, laundry, boiler house and workshops, while beyond is an isolated sanatorium with an operating theatre and accommodation for fifty patients besides isolation wards.

An aerial view of the school buildings

About two and a half miles of covered corridors afford intercommunication between the main buildings. They are lighted by enclosed single-lamp ceiling fittings with shallow ceiling bowls in the lobbies. Similarly an underground duct connecting the houses and main blocks contains the whole of the heating pipes and the hot and cold water, gas and electric mains, which are thus all accessible without disturbance. Wall-mounted bulkhead fittings with inspection plugs provide light in the subways, with two-way switches at all openings.

Messrs. Higgins & Griffiths, Ltd., were the electrical contractors. Apart from lighting, liberal provision of flush inset wall switch-plugs has been made throughout the premises, the extent of which may be gauged from the fact that 14 miles of 2-in. and ¾-in. conduit, mostly of Walsall make, has been installed, together with 46.5 miles of 3/.029 and 7/.036 cables of "Vicma" quality, which is the highest C.M.A. grade; 3,250 yards of "Vicma" 7/.044 and 19/.083 sub-main cables; and 2,200 yards of 0.3 and 0.125 four-core paper-insulated, lead-covered, double-wire-armoured and steel-taped main cables of "Standard" make, all the rubber-insulated cables used being of "Gloverite" manufacture.

Electricity is purchased from the Colne Valley Electric Supply Co., Ltd., at both high and low voltages, 50 cycles a.c. The sub-station is divided: in one chamber are G.E.C. pedestal oil switches controlling two Hackbridge transformers of 100 and 50 kVA stepping down from 3,300 V to 415/240 V for three-phase and neutral distribution; also a separate 415/240-V supply primarily for stand-by use.

To prevent l.v. feed back, these three circuits are interlocked in the adjacent chamber on the main incoming switchboard of three panels, each with a 200-A t.p. oil breaker, voltmeter, and ammeter with three-way switch. Opposite is the distribution board of four 150-A and three 100-A panels, with one spare, each equipped with a t.p. circuit-breaker controlling four-core cables of various sizes outgoing to different blocks of buildings. Both switchboards are of the sheet-steel "dead-front" pattern, black enamelled, with G.E.C. breakers, meters and instruments.

It is possible to convert the two main cables feeding the school houses and classrooms block into a ring main by means of a link box. In the subway one cable is tapped twice at each house by means of tee boxes; at four positions on the other cable this is repeated for the classrooms, two phases only being used, while the third phase goes to the swimming bath and gymnasium at the far end. Otherwise each main distributor terminates in an end box with lead-covered tails to a main switch. At arterial points Higgins & Griffiths sub-main distribution boards have been provided, of the ironclad "dead-front" pattern with back-of-board switches and "Triumph" fuses mounted on "Sindanyo" panels specially made to swing outward for rear accessibility.

About 6 miles of fire alarm and bell wiring has been installed, together with 1,750 yards of multi-core (seven-pair) fire alarm and electric clock control cables. Gent's "Tangent" fire bells, energised by trickle-charged "Exide" batteries, operate in conjunction with two indicator boards mounted in strategic positions, and specially designed to enable the several blocks to be warned in turn according to the direction in which a fire may tend to spread.

The tower clock is motor wound automatically and corrected hourly by electrical impulses from a Gillett & Johnston master clock, which also energises through relays the three separate circuits to which all the slave clock dials throughout the institution are connected. The "Exide" clock battery is trickle charged through a Westinghouse rectifier.

The sanatorium is lighted by enclosed ceiling bowls and single-lamp brackets over the beds. Between alternate beds are bell-pushes and plug sockets for wireless, portable lamps, and electrical treatment. A Chloride 25-V 15-A battery with

"Keepalite" equipment provides emergency illumination in the theatre, which is equipped with spherical pendants and a large shadowless lamp fitting by the Surgical Manufacturing Co., Ltd., over the operating table. Electrical treatment and heating plug sockets are provided; also a J. & E. Hall combined passenger and service lift and an "Electrolux" refrigerator.

In the chapel no lighting fittings whatever are visible to the congregation. All the lamps are concealed behind opal glass panels in the window arches, and recessed behind ornamental metal grills with excellent effect. The altar is illuminated from above by four concealed spotlights.

The assembly hall is 58 ft. wide and 120 ft. long, excluding the stage, which is fitted with coloured lamp footlights of the disappearing trough pattern. On the gallery at the far end is a projector room in which Gaumont cinema equipment is to be installed. Suspended from the roof are two rows of large coloured decorative lanterns made by Messrs. Higgins & Griffiths to the architect's design. All the hall lighting can be controlled by Igranic push-buttons from the projector room, under the gallery and the stage, and dimmers are incorporated in the fuseboard with buzzers for signalling. Under the stage are ironclad "Cantie" push-button controllers for the ventilation extraction fans, which are fitted with rotor regulators for reducing the speed in order to minimise noise.

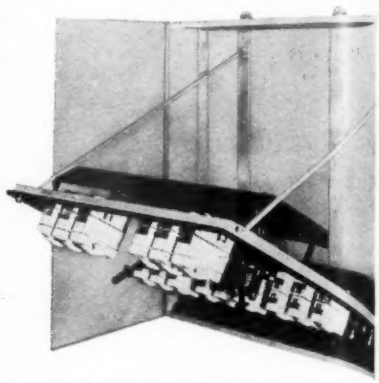
One of the flush lighting panels in the chapel

The radiator circulating pump is driven by a G. N. Haden motor, the temperature of the water being controlled by a Drayton thermostat. An "Electrolux" vacuum cleaner and floor polisher with multiple detachable rotors are in use.

Three ornamental pendants furnish indirect illumination in the library, while enclosed dispersive pendants are used in the classrooms, the light being corrected in the art rooms by the inclusion of "daylight blue" lamps in suspended metal reflectors by John Bell & Son (Croydon). In the science laboratories, besides the normal lighting points, switch-plugs are fitted at the end of each bench, alternately for 240 V a.c. and 12 V d.c. for experimental uses, the d.c. supply being derived through a local switch- and fuse-board either from an "Exide" battery or direct from a G.E.C. motor-generator. The indoor swimming bath is lighted indirectly by wall-mounted trough projectors directed upward to the curved ceiling, with bronze octagonal wall fittings at each end. The gymnasium is lighted by ten octagonal flush ceiling panels, while on each side wall are two glass box badminton lights protected by wire cages.

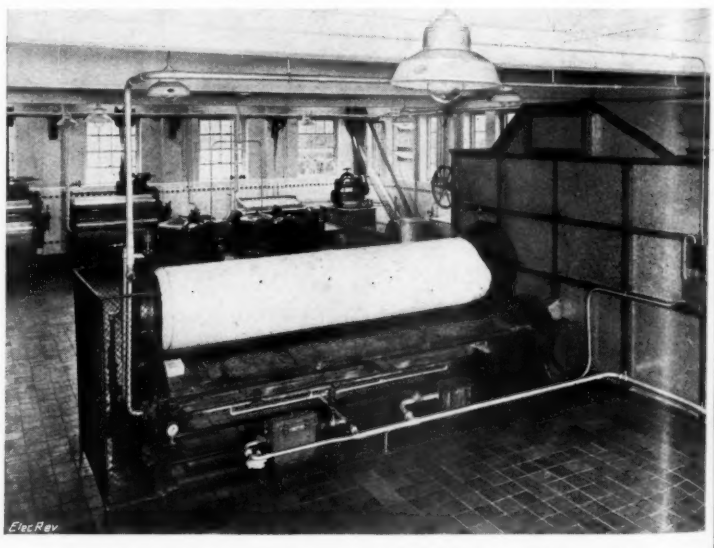
In the main dining hall, which is 120 ft. long and 48 ft. broad, are two rows of four suspended lanterns of Falk, Stadelmann make to the architects' design, assisted by V-shaped glass wall brackets. The kitchens are equipped with a refrigerator supplied by Frigidaire, Ltd., a cold store the manufacturers of which were Messrs. J. & E. Hall, Ltd., and a motor-driven pastry mixer and potato peelers. Inside the hood over the cooking ranges are watertight lighting fittings controlled by watertight switches.

In the adjacent domestic science classrooms only one of the several cookers is electric, of Benham make, with four hot plates in the hob. However, switch-plugs are provided in the walls, besides a number of laundry irons with flexible connectors to pull-cord ceiling switches. Electric irons attached to wall plugs are used in the main laundry, other equipment including a Lane hot-air drying cabinet with motor fan, a motor-driven Manlove, Alliot decouden, Bradford hydro-extractors with Bull motors, and Lane washing machines belt-driven from line shafting coupled to a Crompton, Parkinson motor. Benjamin watertight well-glass lighting fittings are installed.



Sub-main distribution board, in open position

The oil-fired boiler house auxiliaries and pumping plant are driven by Crompton, Parkinson and Bull motors controlled by Brookhirst starters. Two 240-V relay operated "Klaxon" syrens are used to recall the children from the extensive playing fields, in which there is an all-electric sports pavilion lighted by enclosed ceiling fittings. The dressings-rooms and lounge are heated by "Morganite" panels, while in the kitchen there are two electric tea urns, a large kettle, and a 4.5-kW three-phase Benham water storage heater tank operating under contactor control.



A corner view of the laundry, with electric drying cabinet (right)

Electrically Operated Excavators

ALL-ELECTRIC control equipment is employed for one of the largest excavators built in this country with caterpillar mounting. The machine has been constructed specially by Ruston-Bucyrus, Ltd., Lincoln, for the Marston Valley Brick Co., to deal with an output of five to six million bricks weekly. To enable the machine to excavate to a depth of 55 ft. the boom is 85 ft. long and the bucket is of 5 cu. yd. capacity. One bucketful of clay will make 1,500 bricks.

The caterpillar tracks are 26 ft. long, 5 ft. wide, and about 7 ft. high, while the track belts weigh about 25 tons, or three times more than the total weight of a complete ¾ cu. yd. Ruston-Bucyrus shovel. Although of such size, the machine can be easily steered upon its tracks. In order to obtain the maximum economy with ease of operation, the machine is fitted with the Ward-Leonard system of electric control. The digging and slewing motions are driven by means of separate motors of 250 h.p. and 130 h.p. respectively, supplied with power from generators directly coupled to a 375-h.p. engine. A picture appears on page 413.

An electrical excavator which is claimed to be the largest in Europe has just been put into operation at Messrs. Stewarts & Lloyd's new steelworks, Corby.

Weighing 600 tons and towering to a height of 85 ft. over the boom, the new machine can comfortably accommodate twelve men in its bucket, which has a capacity of 15 tons of earth. It can deposit its load 100 ft. from the centre of the machine, or at a height of 70 ft. above ground level, at the rate of one bucketful a minute. The machine runs on rails and is kept on an even keel by patent hydraulic levellers. It is driven by several electric motors totalling 450 h.p., which can be controlled by one man. Messrs. Ransomes & Rapier, Ltd., Ipswich, are the engineers responsible for this excavator.

Steam Turbine Performance. By Sydney D. Scorer

An examination of the cycle of operations

IN comparing the performance of various types of prime-movers the casual observer is liable unconsciously to include in the comparison differences or similarities of a purely constructional nature. The commercial efficiency of a prime-mover certainly depends upon the care exercised during its design and constructional stages, but so many extraneous circumstances enter into the computation of this factor that a more satisfactory estimate of performance is desirable. A reversion to basic facts is, therefore, necessary, and the degree of success attained in utilising the available energy of the working medium, rather than the actual engine, must be considered. For this purpose the energy-conversion process is reduced to its most elementary form, namely, the simple cycle of thermal operations.

Sadi Carnot was among the first to study the performance of an ideal heat engine, and he evolved the cycle of operations now known by his name. In this the working substance is assumed to be contained in a non-conducting cylinder fitted with a non-conducting, frictionless piston, the ends of the cylinder being non-conducting at one end and a perfect conductor at the other. During the first stage in the cycle, heat is supplied to the working medium until it attains a given pressure and temperature. The source of heat is then removed, and the working medium is constrained to expand adiabatically against a resistance (thus performing work), until a predetermined lower pressure and temperature are reached. At this stage heat is taken from the working medium, the last-named being subjected to isothermal compression, at a predetermined point in which all reception or rejection of heat is stopped, and the working substance is compressed adiabatically until it regains its initial condition. If the pressure and volume are plotted at various points in the cycle, it is found that these form a closed curve, the area of which represents the work done by the substance.

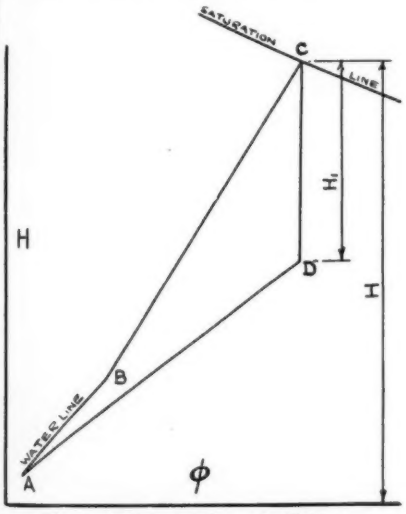


Fig. 1.—Determination of efficiency.

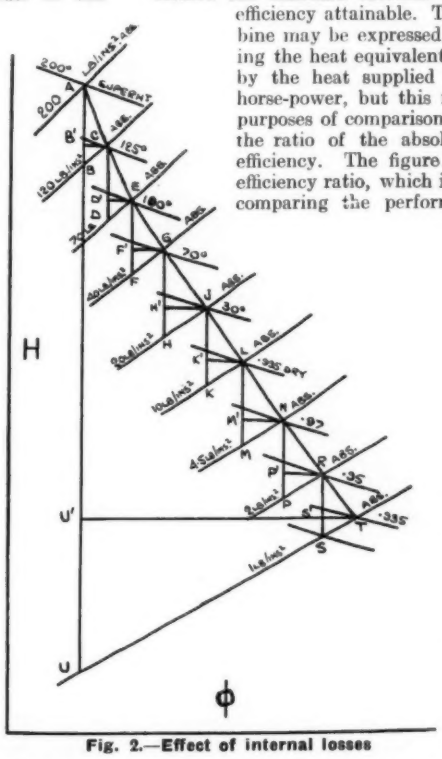


Fig. 2.—Effect of internal losses

The Carnot cycle is of great importance in practical work since it is the basis of the Rankine cycle which, in turn, is a theoretical representation of the modern steam turbine cycle. In the Rankine cycle heat is supplied and the working substance is constrained to expand adiabatically against a resistance, as in the Carnot cycle, but at this stage the similarity ceases. The period of heat rejection and isothermal compression, instead of being arrested at the point where the adiabatic curve through the initial state point cuts the isothermal compression line, is continued until the working substance reverts to its original liquid condition. The fourth stage in the Rankine cycle, namely, the reception of heat and compression to the initial pressure and temperature conditions, is carried out in the feed-pump and boiler.

A Simple Test

By the use of several cumbersome formulæ, the efficiency of an ideal steam turbine working on the Rankine cycle can be examined, but a simpler method from the viewpoint of the operating engineer is to use the Mollier diagram. In fig. 1, A represents the total heat of the water at the lower pressure and temperature; B is the point at which the water is at the same pressure and temperature as the interior of the boiler, while C indicates the total heat of the evaporated water at boiler conditions. This covers the first two stages of the Rankine cycle. At C the steam is admitted into the turbine and expands adiabatically, performing work, to D; the final changes take place along the line DA.

Since the thermal efficiency of the cycle is the quotient of the heat converted into work and the total heat supplied, then in the ideal machine this is H′/H, the quantities being easily measured on the H-φ diagram. This gives what may be termed the standard thermal efficiency, and is the highest efficiency attainable. The thermal efficiency of a turbine may be expressed in an absolute form by dividing the heat equivalent of, say, one horse-power-hour by the heat supplied to the turbine per hour per horse-power, but this method is not satisfactory for purposes of comparison; a better way is to determine the ratio of the absolute to the standard thermal efficiency. The figure thus obtained is termed the efficiency ratio, which is one of the best criteria when comparing the performance of one turbine with another. The H-φ diagram is an admirable vehicle for the determination of steam turbine internal efficiencies. For a practical example, however, certain modifications must be made in the theoretical cycle because of the various internal losses which result in a disturbance of the heat-distribution conditions. In a multi-stage impulse turbine each stage wastes a certain amount of the available kinetic energy, the nozzle loss accounting for some 10 per cent. of the stage heat drop. This is due to friction between the steam and the nozzle walls, &c., the corresponding steam velocity loss being in the neighbourhood of five per cent. On entering the moving blade the available steam energy is reduced by shock loss as well as by blade surface friction and flow losses. The total loss in the blades is about fifteen per cent. of the stage heat drop.

A further loss occurs in the pumping action of the blade discs on the steam, amounting to some two per cent., giving a total stage loss of from twenty-five to thirty per cent. The net result of this effect is to reheat and dry the steam, thus diminishing the effective heat drop per stage, and providing more heat than is theoretically required for successive stages. The reheating has also an effect on the specific volume of the steam, and this must be allowed for in determining the dimensions of the nozzle passages, &c. Generally speaking, the greater the reheating effect the less efficient is the turbine.

The effect of internal losses on the cycle diagram is shown in fig. 2, where figures relating to an eight-stage, pressure-compounded machine are given, the various pressures, &c., being approximate. The initial condition of the steam is represented by the point A, from which the steam expands adiabatically in the first-stage nozzles to 120 lb. per sq. in. and 125 deg. F. superheat to the point B. Owing to the losses referred to the actual expansion takes place along the line AC, the effective heat drop being AB′. The stage efficiency AB′/AB is found from the diagram to be about 77 per cent.; the efficiency of the second stage is 76 per cent.; that of the third, 67 per cent.; and so on. The overall stage efficiency, AU′/AU, amounts to 74 per cent.

The quantity of heat represented by UU′ is rejected to the condenser by every lb. of steam flowing through the turbine. The sum of all stage heat drops such as AB, CD and EF is greater than the total Rankine heat drop AU, and the ratio of ΣAB/AU is termed the reheat factor. This factor varies as the stage efficiency, the pressure ratio of expansion, degree of superheat, &c., and is always greater than unity, but it is of greater interest to the designer than to the operating engineer.

The condition curve of a turbine, as shown in fig. 2, provides the operating engineer with information on the steam conditions at various stages in the machine. In regenerative feed-water heating, it is usually considered inadvisable to bleed

the steam before it reaches the dry-saturated condition. In the example just considered the condition curve cuts the saturation line when the steam pressure is about 12 lb. per sq. in. absolute, corresponding to the fifth stage, so that dry-saturated steam could be tapped off between the fifth and sixth stages.

The variation in thermal efficiency, as derived from the H-ϕ diagram, is also of interest in considering the effects of increased steam pressure and temperature. The thermal efficiency at first rises quickly with an increase in steam pressure, but after attaining a maximum value it begins to fall off with additional pressure increments. This is due to the decreased stage efficiency consequent upon higher steam densities and clearance losses, and upon the increased moisture content in the low-pressure stages. At 300 lb. per sq. in. the moisture is of the order of 6 per cent., whereas at 1,500 lb. per sq. in. it is some 9 per cent. greater. Incidentally, at the higher pressure the adiabatic heat drop begins to diminish. Increase in steam temperature at constant pressure, however, results in a proportional increase in stage and overall efficiency. The extra superheat reduces fluid friction losses because of the lower moisture content in the low-pressure stages, and tends also to reduce clearance losses at the high-pressure end of the machine.

The Paris Radio Salon

THIS year's radio show, held at the Grand Palais, Paris, was disappointing in some ways and surprising in others.

An attractive stand at the Paris exhibition

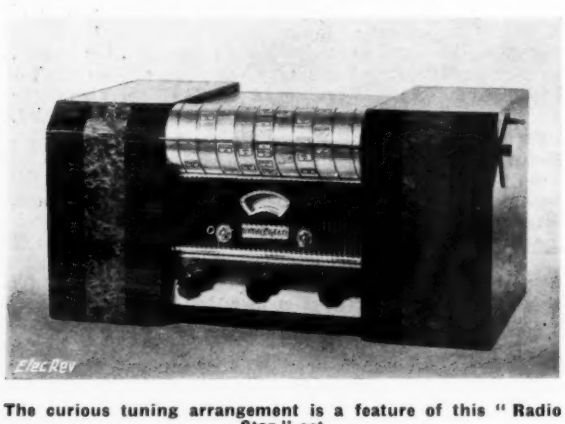
Improvements were mostly concerned with detail. It was particularly noticeable that the makers had taken considerable pains to stress the improvements in anti-fading devices and also measures against static and electromagnetic troubles.

The novelty of the show was the octode valve, which was to be found in almost all the sets exhibited. Then, again, for the first time most of the sets shown could be fed from all mains whereas formerly only a.c. networks could be used for the purpose.

Automatic Regulation

There had been considerable improvement since last year's show in automatic regulation, and radio-frequency amplification and sound quality were very much better. One or two firms offered batteries built into the sets, especially designed for people living in districts where electrification is not yet complete.

Perhaps the most luxurious set was the " Point Bleu W.135," which has a four-sided dial, on each of three sides being the short, medium, and long waves, with all the stations marked in different colours. There is a luminescent blue ball which moves up and down the dial to indicate the stations. The tuning is aided by a neon indicator, and a system of semi-automatic control of variable condensers is incorporated.



The curious tuning arrangement is a feature of this " Radio Star " set

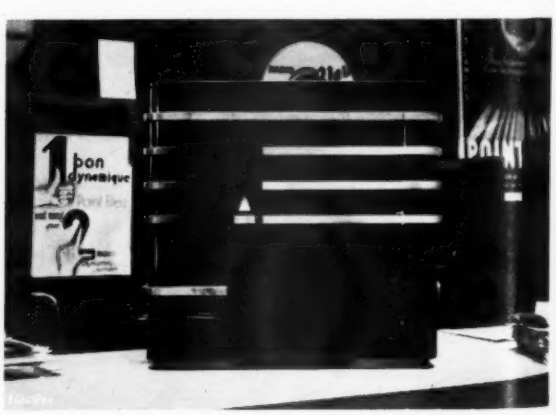
Generally speaking, the tendency appeared to be to build the sets around the valves rather than to fit the valves into the sets. The octode valve practically had the stage to itself. Many makers confessed that this changing of valves was really having a bad effect on business, since they were afraid to make and supply a model with valves which might be out-of-date within six months. Also, it had the effect of keeping the prices of new valves a little high.

" Philips " exhibited a number of new super-inductance coils of a specially small size and an octode superheterodyne which is extremely selective. They also introduced an interesting micrometric dial with a special section which can be put in or can be taken out, giving the names of the different stations. Visual silent tuning was another feature.

" Radio-Star " introduced something quite new, namely, a " Selectrol " in place of the usual dial. In this the names and wave-lengths of the different stations are inscribed on a cylinder on a helicoidal band 1.75 m. in length and a handle at the side turns the cylinder. This innovation attracted considerable attention, the set being the only one possessing this interesting change.

Short-wave Sets

Many short wave sets were to be seen, generally for from 17 to 55 m. for the short waves, 200-550 m. for medium, and 1,100-1,950 m. for long waves. The " Ondia " set has a range from 19 to 2,000 m. It includes anti-fading devices and frequency changing by octode valve. It has four visual controls with two knobs, the right hand knob pulling out to regulate a small indicator controlling the short, medium, and long waves; in the normal position it controls the larger indicator of wave-lengths. The left-hand knob controls the tone when pulled out, shown by the lower centre small indicator, and in the normal position it controls the volume on the left-hand small indicator.



The " Point Bleu W.135 " set, one of the most luxurious in the show

Throughout the show two principal types of sets were shown, both tending to simplify manipulation and to improve the tone quality. They were the octode oscillator-modulator and the superinductance, which was much in evidence but proved itself to be really good only when constructed with especial care.

Both have two stages of high frequency, connected so as to give effective volume control. Detection is by duo-diode and pentode, which gives a higher efficiency to the volume control. The final valve is a pentode.

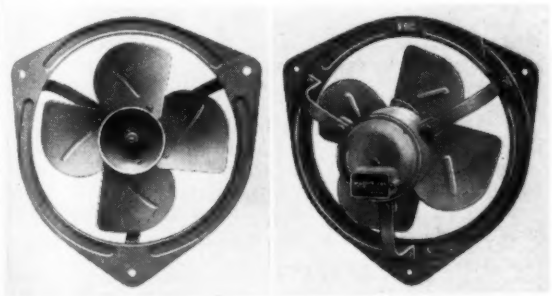
Electric Exhaust Fans.

By J. Dummelow, M.A.(Cantab.)

AN economical solution of the problem of securing efficient ventilation in theatres, cinemas, ballrooms, kitchens, laundries, factories, paint-spraying shops, and similar places, is provided by the use of electric exhaust fans. Modern fans of this type are robust in construction and efficient in operation, and the standard commercial types have a very wide range of applications, being suitable for all ordinary installations such as in factories and public buildings. Only in special circumstances, where an abnormal degree of regulation is specified or the fan is required to work in high ambient temperatures (100 deg. F. and above) or to be exposed to rain, may non-standard designs be necessary. In all cases it is important that the most suitable size and type of fan for the particular duty should be chosen, and that it should be properly installed.

Exhaust fans are usually fitted with either four-way propeller or box-type blades, the former being more satisfactory, as they give a heavier air displacement. Most of the weight of the blades is at the centre, and their rigid construction makes them suitable for high speeds. They run very quietly, particularly at medium and slow speeds, and the four-way blades enable large volumes of air to be handled efficiently against considerable resistance to the air stream on intake or discharge, such as may be set up by trunking and bends, restricted airways, grilles, guards and filters, while in many cases they can be used in place of centrifugal fans at considerable reduction in the initial cost, energy consumption, and space occupied. If reversible blades are fitted, the fan can be run in either direction under the control of a simple switch.

Box blades, which, when viewed axially almost fill up the opening in the fan ring, should never be employed on high-speed fans or where there is any resistance to the air stream; most of their weight is distributed at the circumference, so that not only is accurate balancing extremely difficult, but also any slight out-of-balance is considerably magnified (particularly on a.c. supply), setting up a pulsating magnetic note. They may, however, be used at slow speeds when they operate fairly silently, provided the volume of air handled is relatively small and the intake and discharge are free from obstruction.



A.c. exhaust fan with four-way propeller blades

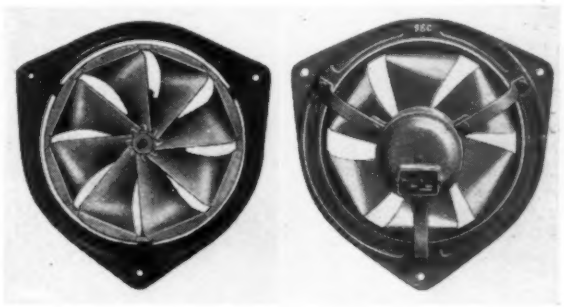
A large range of sizes from 9 to 60 in. in diameter (across the circle described by the tips of the blades) is available, giving air displacements from 445 to 44,400 cu. ft. per minute, or free intake and discharge (e.g., when fitted in the wall of a room). In view of the exaggerated figures often claimed, it is important to choose makes for which the displacements quoted are based on the testing methods specified in the report of the Fan Standardisation Committee appointed by the Institution of Heating and Ventilating Engineers and adopted by the Admiralty, the National Physical Laboratory, and H.M. Office of Works.

The air displacement required (and therefore the correct size of fan) for any particular duty can generally be based directly on the size of the room to be ventilated and the number of times per hour that the air should be changed; it is, however, advisable to use a factor of safety of 25 per cent. on the calculated figure.

Number of Air Changes Required

A general guide to the number of changes of air required in different situations is as follows:—Private offices, 4; public waiting rooms, 4; ballrooms or large public halls, 5; general offices, 6 to 8; small ballrooms, 8; general factories, 8 to 10; large restaurants, 8 to 10; small public halls, 10; lavatories, 10 to 15; small restaurants, 10 to 15; cinemas and theatres, 10 to 15; large kitchens, 15; small kitchens, 15 to 20; engine rooms, 20; laundries, 20 to 30; rooms with noxious fumes, 30 to 40. In public halls, cinemas, and theatres where smoking is allowed, these figures can be safely doubled, up to an equivalent of 1,000 cu. ft. per person per hour. For example, a room used by day as a restaurant and in the evening as a meeting hall will require twelve changes of air per hour; if the floor area is 35 by 25 ft., and the height 15 ft., giving a cubic capacity of 13,125 cu. ft., the air displacement necessary is 157,500 cu. ft. per hour, or allowing a factor of safety of 25 per cent., 196,875 cu. ft. per hour (3,280 cu. ft. per minute). A fan of ample size can then be chosen.

When working in disused chimneys, against static pressure, or in ducts, the output of exhaust fans is, of course, considerably reduced (by as much as 50 per cent. or more) from that obtainable on free intake and discharge, and the size required is correspondingly increased. The size and height of the chimney, the height of static water gauge, or the cross section and length of the duct and the number, angle, and radius of its bends, must be taken into account. For working against static pressures up to ¼-inch w.g., fans may be of the standard type; up to ½-in. w.g. high speeds are necessary, and up to 1-in. w.g. blades of special construction having wings of heavy gauge, oversize shafts, and other modifications are required. Specially selected or designed fans will work satisfactorily in ducts of suitable area and section, either circular or approximately square, provided that the inside radius of the bends is not less than one diameter (preferably two diameters or more).



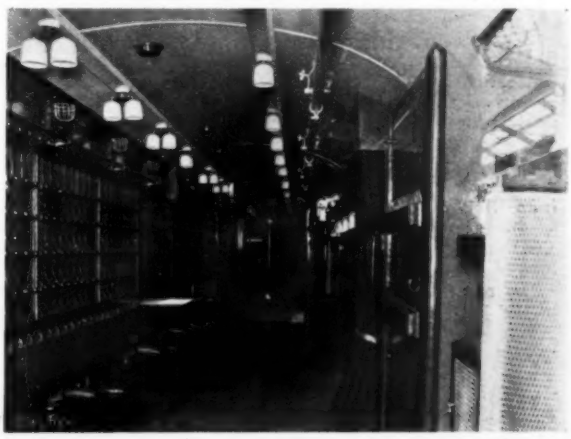
A fan with box-type blades

Where silent operation is very important, e.g., in cinemas, churches, masonic halls, public meeting halls, board rooms, cardrooms and offices, either a specially quiet fan must be chosen or a large size running at a slow speed (obtained either by design modifications or by the use of a regulator) must be adopted, and four-way propeller blades should always be used. The noise due to the movement of considerable volumes of air ("air rustle") makes it impossible to obtain absolute silence, but a correct type of fan suitably installed should be almost inaudible.

Travelling Post Offices

FIVE new "travelling Post Office" vans, four of which have net apparatus for picking up and delivering mail-bags from and to the lineside while travelling at full speed, have been built at the L.M.S. Railway's works at Wolverton (Bucks) for service on express postal trains. Each van is equipped for the sorting of letters and newspapers *en route* and carries the designation "Royal Mail" in bold letters on the sides. The largest vehicles are 60 ft. long and their equipment includes an electric water heater and electric oven for the use of the travelling staff.

As will be seen from the accompanying picture, very adequate lighting has been provided.



The interior of one of the new L.M.S. travelling Post Offices

Automatic A.c. Starters. By H. Rolls-Renfree

Notes on their protection

THE increasing demand for automatic control gear for use in conjunction with a.c. motors is bringing in its train a call for protective features for the motor and equipment additional to those which are deemed sufficient for hand-operated control panels. This may be due to the absence of an operator who would otherwise be more or less in permanent attendance and therefore in a position to deal with any emergency which might arise. With schemes such as obtain in modern automatic pumping stations, for instance, the whole of the equipment must function in accordance with a predetermined schedule and sequence, and at the same time the equipment must be adequately protected in the event of any unforeseen interruption of the normal course of operation.

Mr. H. Rolls-Renfree is with Brookhirst Switchgear, Ltd.

Protection against a failure of supply or an undue reduction of pressure is provided by the usual no-volt release, or the operating coil in the case of contactor gear, and this feature follows the practice which has always been adopted with motor starters.

Overload protection is also provided for in the usual manner, either by fuses or overload trips, the latter being generally embodied in the control panel and fuses mounted on the incoming distribution board. The overload trips may be of the thermal or solenoid type. The thermal trip has given reasonable satisfaction when used in conjunction with industrial gears, where inspection may be frequent, but there is an increasing tendency to insist upon the solenoid type, which seems to imply greater faith in its reliability, particularly when the control panels may be situated in inaccessible places.

If thermal trips are incorporated in the panel then some kind of fuse *must* be provided, either on the incoming supply board or in the starter panel, in order to give protection against short-circuit currents, as the time lag feature is inherent. On the other hand solenoid trips fitted with dashpots provide a time lag under normal conditions of service and at the same time give the necessary protection against short-circuit currents without the aid of fuses. Further, they are more positive in action and adjustable from the full load upwards without requiring skilled attention.

An interlocked isolating switch should be fitted on the panel if fuses are incorporated to enable replacements to be effected without the danger of anyone coming into contact with "live" parts; in fact, it is desirable to have this fitment in all cases irrespective of whether fuses are included or not, as it provides "safety first" isolation. Such a switch is recommended by leading authorities, although it is not essential in order to comply with Home Office requirements.

Additional Safeguards

The features which I have described ensure the normal protection of an electric motor and are in accordance with past and present practice. In the case of automatic starters, however, it is occasionally possible for the rotor contactor or contactors, when fitted, to remain inoperative, *i.e.*, fail to close and short-circuit the starting resistance after the main contactor has closed, so that the normal resistance would be liable to burn out. Some authorities overcome this possible contingency by specifying a liberally rated resistance, enabling the motor to run with some portion or all of it in circuit, depending upon the nature of the load, the motor would accelerate to a speed at which it could maintain the load. Other authorities prefer the motor to be disconnected from the supply in the event of the rotor contactor or contactors failing to close, and this protection is given by incorporating an adjustable time relay in the panel. Its operating coil is energised immediately the starting control switch is closed, and breaks all the control circuits if the starting operation is not completed in the predetermined time.

Another form of relay which is now being frequently specified shuts down the motor in the event of a phase failure occurring due to the opening of a supply line at any point. If the line phases should for any reason become reversed the motor is prevented from starting until the phases are reconnected in their normal order; or if the line voltage falls below 85 per cent. of the normal, the motor is shut down and cannot be started again until the line voltage has returned to at least 90 per cent.

In connection with electrically driven vertical turbine pumps for boreholes, the demand for which is increasing every year, it is essential that all the bearings should be adequately supplied with water, as any failure of water supply to the various bearings would be fatal to the working of the pump. To guard against such a possibility the pump makers provide a special balance switch, which has a centre leaking tube. A small aperture is cut in the tube at the bottom of the balance tank so that if the water from the bearing jacket fails the tank empties itself and the balance weight automatically causes the switch to make contact and, through a solenoid time relay mounted on the starter panel, causes the circuit-breaker to open, thereby shutting down the motor.

Audible and Visible Indications

It is sometimes required to provide audible and visible indication of any untoward occurrence, particularly if the starting panel is located some distance away from the point of control. This requirement may be met by fitting auxiliary switches, or it may be found necessary to include additional relays, depending upon the nature of the desired warning and scheme of control. This feature enables the operator immediately to investigate the cause of the interruption while, at the same time, the motor is automatically stopped and the complete equipment protected against any damage which may occur.

French Electrical Activities

THE work of interconnecting the various power plants has received a considerable impetus with the approval of the construction of a series of lines to connect the plant on the Rhone river with the hydro-electric plant at Kembs on the Rhine and the thermal plant of the Siderurgy Lorraine, and to link these in turn to another group in the Paris region. The most important work in connection with this is the construction of a 220-kV line from Henri Paul, in the Rhone region, to Greney, a distance of 190 km., the construction of a substation and regulating plant at Greney, and of a 220-kV line from Greney to Paris, 140 km. away. The three aluminium conductors will be of 412 sq. mm. section, and the earth cable of 80 sq. mm., suspended from suspension insulators. A new type of tower is to be used on these lines.

The recently finished Kembs plant already supplies energy in the east of France as far as Troyes and Rheims. The Forces Motrices du Rhone is enlarging its plant with a view to this new connection, and is replacing a number of 1,200-h.p. generators by 6,000-h.p. generators. In line with this, the recently formed Société Inter-Paris is working out the connections at the Paris end, and will construct lines tying together various Paris plants with the terminus of the Greney-Paris feeder. The latter will be ready for service by next July.

The crusade against noise in Paris is now directed at the machines in certain sub-stations of the Paris distribution company. As a result the company has, after long experimenting, succeeded in building a noiseless motor-generator, which is at present being tested under normal running conditions in one of its sub-stations.

A recent decree approves the construction of a 220-kV line from the hydro-electric plant on the Drac river to Paris.

The Compagnie des Forces Hydro-electriques de la Cere contemplates doubling the capacity of its station at Lamtive, and also the construction of works to increase the capacity of the Esterre plant. It has decided not to build the projected plant at St. Etienne at present.

The electrical syndicate of Morocco has established a series of standard prices for electrical work in that country. This is intended to combat the practice of some contractors who take advantage of the relatively isolated nature of much of the country to charge excessive prices for work.

Since the introduction of coins in France to replace the old paper notes of five, ten and twenty francs, counterfeiters have been reaping immense profits. Now, however, an engineer has devised a machine which will determine whether a coin is good or not by measuring its electrical resistance.

Public Lighting Engineers' Conference

THE 11th annual conference of the Association of Public Lighting Engineers, held at Aberdeen from September 17th to 20th, received the full official recognition of the Municipal Corporation, whose inspector of lighting, Mr. Alexander Forbes, took over the presidential office immediately after the official welcome on September 18th. There had been a civic reception at the Art Gallery on the previous evening, and the conference was heralded by an exhibition of street lighting, as detailed in our issue of September 14th.

Mr. E. M. Severn, the retiring president, was in the chair for the official welcome on September 18th, when Cr. A. Reid observed that the necessity for good street lighting could not be brought to the notice of the public too much, and it was the duty of Lighting Committees to support their engineers in their efforts to bring about improvement in this respect. In his presidential address Mr. A. Forbes briefly described the street lighting of Aberdeen.

The first paper discussed was that of Messrs. J. M. Ward and J. Mann, on "Lighting Department Practice and Equipment," being an account of the experiences, experiments, and progress made by the Glasgow Corporation Lighting Department, which the authors took pride in recording had been in existence for over 100 years. It was stated that the staff of the department totalled 1,189 and the annual expenditure on street and stair lighting amounted to £320,000. The electrical staff consisted of 101 persons, who carried out the complete installation of street lighting circuits.

The department's experience with underground cabling for street lighting had not been favourable, and practically all the cable now erected for street lighting was overhead. Time switches were used in certain instances, but the general policy in Glasgow was to concentrate on central switching control by means of electric relays. All electric lamps of from 150-1,000 W were renewed after burning 1,000 hours, and with 9,000 lighting units there was an annual lamp bill of £10,000. A careful system of checking the lives of lamps had interested the manufacturers in failures of lamps occasioned by the ingress of water. This had been overcome by a new design of bracket and, in one case, a differently shaped bulb.

Mr. J. F. Colquhoun (Sheffield) asked for further information with regard to the electrical board controlling 2,000 lights, referred to in the paper. The author's graph showing the relation between rainfall and lamp renewals should be of the greatest assistance to the manufacturers.

Overhead or Underground?

With regard to overhead lighting cables, Mr. James Sellars (Manchester) said that while he was not an opponent, inquiries he had made showed that there were strong differences of opinion on the matter. He was informed by some of his correspondents that they were constantly overhauling their overhead cables and could not give them a life of more than fifteen to twenty-five years. On the other hand, there was very little doubt that a well-laid underground cable would have a life of forty years.

Mr. A. W. Barham (Watford) stated that in his area underground cables had always been used and some that had been in the ground for thirty-six years were as good as new. It seemed to him they could well have a life of 60 years. Regarding electrolysis, he used to have trouble due to stray currents, but it was very local and by the use of a special form of protection that trouble had been overcome.

Mr. J. K. Brydges (Eastbourne) asked for experience of the latest type of electric control for a.c. systems. The Strowger system had been introduced with great success in connection with a large housing estate near Liverpool, on the same lines as the selenium cell system.

Mr. R. E. Rogers (Liverpool) remarked that remote control was still in its early and experimental stages, although it had met with great success. In Liverpool they were operating two estates, one with 500 lamps and the other with 300 lamps, but on one estate where the wiring was overhead a considerable amount of trouble had been experienced at first, although means had since been found for overcoming it. On the other estate, used mainly with underground cable, it had been quite successful.

Mr. W. J. Liberty (City of London) said that the whole of the lighting of the City of London was by central suspension and the cables were underground, the reason being that there should be no disfigurement of the streets. The cables were laid as long ago as 1900, and there had never been any trouble.

Mr. C. E. Allsopp (Bradford) said there was 90 miles of street lighting in his area and 70 miles equipped with overhead cables. Some of it had been up for twenty years and there had been no failures of importance. Apart from the æsthetic aspect, there were advantages in initial cost and ease in getting the work of erection and fitting carried out. Experience had shown that there was not the same reliability with underground street lighting cables as with ordinary small distributors, the lighting cables being more liable to injury as they were not so robust. Although in laying out a new housing estate underground cables recommended themselves, there was the question of reliability to be considered in favour of overhead cables. At the same time, where the cost was not so important, underground cables should certainly be considered.

Mr. C. H. Woodward (Bournemouth) further commented on overhead versus underground cables. In Bournemouth the

The Exhibition Hall, Aberdeen, illuminated by G.E.C. floodlights

street lighting came off the distributors, with the result that the lighting suffered from the same voltage drop regulation as did the ordinary consumer.

Mr. Allsopp (Bradford) said that in Bradford also the street lighting was taken off the ordinary distributors, two circuits one way and two the other, and care was taken to see that the circuit length was such as to avoid a heavy pressure drop.

Mr. Mann, in reply to the discussion, said the authors were disappointed that so much of the discussion had been taken up with the question of overhead versus underground cables. Most definitely he held the view that the cost of installation was considerably cheaper in the case of overhead wires.

Mr. Ward, also replying, said that in certain cases in Glasgow where new housing estates had been built the soil simply ate up the cables in a very short time despite all precautions, and that was an important factor which led to the decision to adopt overhead cables.

A Demonstration

On the first afternoon there was a demonstration of street lighting calculations by Mr. W. J. Davey, research illuminating engineer to Messrs. W. Parkinson & Co., who showed how the extended use of directional reflectors had caused a minor revolution in photometric methods and street lighting calculations, and emphasised that a multiplicity of polar curves was now necessary to show the distribution of candle-power. He pointed out that the sinusoidal diagram, already extensively used by geographers and astronomers, had been called into service, but added that the use of the photo-electric cell had made it possible to speed up the candle-power determinations. In the Parkinson laboratories the photo-electric cell was fitted to a hoop revolving round the lamp so that the sensitive surface was always normal to the light surface. Mr. Davey also described a method which enables test-point illumination to be calculated without the necessity of drawing a plan of the installation.

Outstanding features of the lighting exhibition were reviewed by Mr. J. S. Dow (hon. secretary), who said that there was a notable device for distance control which obviated the rather complicated thermionic valve and made the automatic lighting and extinction of lamps much simpler than hitherto. In connection with the discharge lamp three distinct changes were worth noting. The first was the attempt to change the colour of the lamp by introducing a little red light. Secondly, there was the effort to diminish the size of the lamp, and, finally, the question arose as to the merits of burning these lamps in the horizontal position. That involved certain technical difficulties, which were being surmounted by electro-magnetic deflection of the stream of gas, but the vertical position had certain inherent advantages for street lighting.

Apparatus which had been devised at Oldham for removing

paint from lamp-posts was described by Mr. C. Worswick, assistant lighting superintendent. A furnace was placed around the post with silicate of cotton held in wire netting as the heating agent. The paint was heated for six minutes, the post being then scraped. A further heating for six minutes followed, and any residue left behind by the scrapers was carbonised and brushed off easily with a wire brush. The cost of materials for treating one pillar was 1s. 6d.

The annual meeting was held on the Wednesday, when the president referred with regret to the ill-health of Lieut.-Commander Haydn T. Harrison, who had taken a prominent part in the past work of the Association. A telegram of good wishes was sent, asking Commander Harrison to accept honorary membership of the Association.

Mr. A. M. Bell, public lighting superintendent, Tottenham and District Gas Co., was elected vice-president for the coming year, and he will assume office as president at next year's Conference, to be held in London. Messrs. J. F. Colquhoun (Sheffield), H. V. Emptage (Margate), J. Sellars (Manchester), and H. W. Gregory (Wembley) were elected to the Executive Council.

New Fittings

On the second day Dr. S. English presented a paper on "Some New Forms of Street Lighting Fittings," in which he mentioned a demonstration on an experimental road in the Bois de Vincennes, on the outskirts of Paris, of filament lamps in silvered glass reflectors, the glass bulb being a pronounced yellow. The reason for this was stated to be a preference by motorists for yellow headlights, these being supposed to give increased fog or mist penetration, increased visibility, and reduced glare effect. In the case mentioned, the effect was said to be not unpleasant, but the results produced by 500-W lamps spaced less than 100 ft. on a light-coloured concrete road surface were not quite up to expectations.

Another item of special interest, he said, was the development in this country of a fitting for use with filament lamps. Although with the adoption of higher mounting and closer

Public Gardens, Aberdeen, floodlighted by "Osira" lamps

spacings for town lighting the British Standard specification has encouraged the dome type of refractor with satisfactory results, rather more even illumination than could be obtained with dome reflectors was necessary on certain occasions. In such cases it was convenient to be able to attach to a standard dome refractor an attachment to convert it into a virtual bowl type, and this had been done by providing a dish with internal prisms of lenticular formation designed to fit under a dome refractor and to convert it into an enclosed unit.

Mr. G. H. Wilson (Wembley) said the fittings described and illustrated by the author gave the impression of a tendency towards complication. He exhibited a lantern slide of a fitting consisting of a simple opal globe containing a discharge lamp, the light being re-directed in a downward direction and producing quite a wide spread with maximum intensity at about 60 deg. to the vertical, the sort of illumination required for inter-sections and open spaces where a pleasing diffusion was necessary. Mr. Wilson then pleaded for greater care in fixing lamps in their correct positions in the fittings, and said he was convinced that it was not the lamps or the holders which were chiefly to blame, but the skew assembly of the lampholder in the fitting. At Wembley an investigation had been made into the probable performance of discharge lighting sources burning both horizontally and vertically in fittings of the highest efficiency obtainable, and the results tended to show that while with the horizontal lamp there was greater efficiency, this type did not give the same high uniform road brightness or such shadowless lighting as could be obtained with the vertical lamp.

Mr. J. Kemp (London) said he had seen the French yellow lamp installation. He agreed that visual acuity was infinitely better with yellow motor car headlights, but thought it was a doubtful point whether yellow lighting in general would facilitate the perception of objects on the road. He believed the main object in developing the horizontal discharge lamp was to get an effective cut-off in the region of 80 deg. in order to reduce glare and add to the general visibility on the road.

Mr. H. S. Allpress (Birmingham) suggested that breakage of glass was not so much due to temperature as to temperature gradient, and he had found that by using two thicknesses of glass a more uniform temperature was obtained which prevented the breakage of the prismatic glass. A definite cut-off to prevent glare was used in a well-known type of reflector on the Continent which gave remarkable visual acuity and should be applicable to arterial road lighting, but for some reason it did not seem to be acceptable to the English mentality. Sufficient attention was not being paid to the importance of road brightness. For this purpose the fittings required to be very high and width of illumination was also an advantage.

Mr. E. Stroud (Holophane, Ltd.), agreed that lantern design should be as simple as possible.

Mr. C. C. Paterson (General Electric Co., Ltd.), suggested that what might be regarded as the ideal distribution for street lighting purposes should be approached very carefully. In future, possible ways of lighting might involve greater intensities in the horizontal direction without being so serious as some people thought from the point of view of glare.

Dr. English, replying to the discussion, remarked that the heat from discharge lamps was greater than many people realised. By putting, in effect, a blanket on the outside they were likely to cure the trouble of breakage due to temperature gradient. Dr. English agreed that when street lighting engineers made up their minds what they wanted, their needs could be met.

At a luncheon given by the Lord Provost, Magistrates, and Council of Aberdeen, Mr. C. W. Sully (President of the Illuminating Engineering Society) proposed the toast of "The Association of Public Lighting Engineers." He spoke with satisfaction of the Ministry of Transport's determination that street lighting should be materially improved.

Road Surface Reflection

At the concluding session on September 19th Mr. C. H. Woodward, lighting superintendent, Bournemouth, dealt with "The Design and Application of Traffic Signals," while Mr. J. M. Waldram, of the G.E.C. laboratories, spoke on "Road Surface Reflection Characteristics and their Influence on Street Lighting Practice." The latter paper discussed the relation between the appearance of an illuminated road surface, the reflection properties of the surface, and the distribution of light from the light source and its position, while special methods were outlined for plotting a street in perspective. The author described new means of determining the brightness of the street surface and gave data on the reflection properties of a two-coat asphalt surface.

Major L. Roseveare (Eastbourne), who represented the Institution of Municipal and County Engineers, suggested that the paper would re-orientate their ideas of the art of street lighting. Road engineers, he considered, must try to get something intermediate between bright and matte surfaces.

Mr. W. J. Jones (Lighting Service Bureau) said that for years they had been content to measure solely illumination, but the author had now shown the importance of brightness. They must bear in mind the importance of illuminated backgrounds in relation to contrast.

Mr. C. C. Paterson (G.E.C.) remarked that the avoidance of glare was an old tradition which they had been trying to support, but the fact that the author had shown that the brightness of streets, owing to the glancing incidence of light on the road, was so valuable and enhanced the brightness at distances of 400 to 600 ft. from the source, seemed to necessitate a review of the position to see whether they were not sacrificing good visibility for the sake of what they feared from glare. It was possible to put up with a great deal of light in the eye from the source if the contrast which one had to look at was great enough.

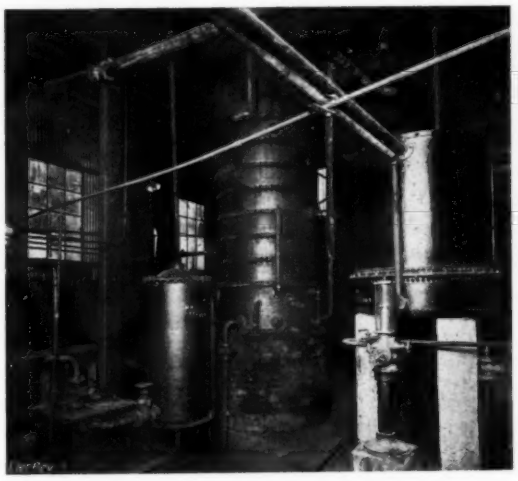
Mr. H. S. Allpress (Birmingham) showed a slide of a road in his area which had centrally suspended lamps and claimed that the excellent results obtained were an answer to the challenge thrown out in the paper.

The final paper was presented by Mr. G. H. Wilson, the subject being "A New Lighting-Up Time Table Based on Illuminations Requirements." The table was calculated on a basis that lamps should be lighted and extinguished at times when daylight illumination on an overcast day had fallen to a value at which vision outdoors became uncertain. Observations extending over a year had confirmed the times calculated.

Power Alcohol. By A. E. Williams, F.C.S.

OFFICIAL figures show that the consumption of power alcohol for the past year was nearly six times that of the previous year; the present rate is over one million gallons per annum.

There appears to be little likelihood of alcohol alone being used to any great extent for automobile engines due to starting-up difficulties, but for engines in generating stations, for driving workshop machinery, farming implements, and isolated electric lighting sets, the problem of starting up does not offer unsurmountable difficulties.



Messrs. Blair's power alcohol distilling plant at Govan

Alcohol manufactured from potatoes costs about sevenpence per gallon of 96 per cent. spirit. Power alcohol in this country is prepared from molasses, the supply of which is limited to the amount of sugar refined, but unlike petrol and coal, potatoes provide an inexhaustible supply of raw material. Already hundreds of acres which were formerly devoted to grazing only are now being utilised for potato-growing, but as the average acre of land sown with potatoes yields only about 160 gallons of 96 per cent. alcohol, a much greater potato industry will have to be established here to supply the constantly increasing demand. What is probably the largest potato-alcohol factory—said to cost one million pounds—is nearing completion at Park Royal, Middlesex. In the Irish Free State several power alcohol distilleries are being erected. On the Continent, particularly in Germany, alcohol has long been in use for portable generating sets and agricultural machinery. During the war the Germans relied almost exclusively on potato spirit for the generation of current in the field among other purposes.

By-products such as fusel oil, aldehydes, form deposits in the cylinders of an engine, lowering its efficiency. A plant designed by Messrs. Blairs, Ltd., at Govan, deals with the weak fermented potato- or molasses-wash, containing 7 or 8 per cent. alcohol, converting it to concentrated spirit in one passage through the plant, which includes seven distilling and rectifying columns for the expulsion of aldehydes, oils, and gumaceous matter.

Numerous tests, both in this country and on the Continent, have shown that alcohol as an engine fuel is at least as efficient and economical as petrol or benzol. Starting up is usually accomplished on a more volatile fuel, as an alcohol-ether mixture, petrol, &c. The low vapour tension of alcohol, about 12 at zero C., compares unfavourably with 46 and 26 for petrol and benzol respectively. Pure alcohol has a flash point of approximately 12.9 C. and the addition of two per cent. of pyridine denaturant raises this about 1 deg. C. only.

The theoretical quantity of air required for the complete combustion of a specific amount of fuel is represented by: $A = 0.116\ (C+3\ (H-\frac{1}{8}\ O))$ in which A = air required; C, H and O = percentages of carbon, hydrogen and oxygen in the fuel. Alcohol (C_2H_5OH) which contains about 35 per cent. oxygen, or a little less when the presence of the denaturant is allowed for, requires less air than petrol and benzol, which are made up principally of carbon and hydrogen. Thus it requires only about eight times its own weight of air whereas petrol needs about fourteen times.

Potato spirit always includes a trace of carbonic acid, which attacks galvanised tanks or carburetters of zinc alloy, giving rise to a troublesome deposit of zinc carbonate and oxide; which, in the case of the carburetter, quickly diminishes its efficiency.

The main advantages of alcohol are that it renders possible the use of engines of much higher compression; the deposit formed in the cylinders of the engine is only a small fraction of that found with petrol or benzol; it ensures a cooler engine; and it can be produced entirely from home-grown raw materials.

A Motor-vessel's Electrical Auxiliaries

THE twin-screw motor-vessel *Waiwera* which successfully completed her trials recently is the first of three refrigerated cargo ships which Messrs. Harland and Wolff are building for the Shaw Savill and Albion Company. She is to be employed in her owners' London-New Zealand trade, voyaging *via* the Panama Canal and dealing principally with the carriage of perishable produce such as meat and fruit. She will be followed by the *Waipawa* and the *Wairangi*. A feature of these vessels is the extent to which electricity is employed for operating the auxiliary machinery both in the engine-room and on deck. Built to fulfil the requirements of Lloyd's Register for classification 100 A1, the *Waiwera* is 515 ft. long and of 10,760 tons gross, being propelled by two ten-cylinder, four-stroke cycle, single-acting airless-injection Diesel engines.

Auxiliary power is obtained from four six-cylinder Diesel engines of the same make as the main engines, each of which is direct coupled to a d.c. generator of 300-kW capacity. In addition there is a 25-kW Ruston-Laurence, Scott emergency set situated on the navigating bridge. The hull is subdivided to yield six large cargo holds, three forward and three aft of the machinery space and all of these with the exception of the last are insulated for the carriage of refrigerated produce.

The refrigerating machinery comprises three CO_2 compressors supplied by Messrs. J. & E. Hall, Ltd., Dartford, each being driven by a 160-b.h.p. electric motor supplied by Messrs. W. H. Allen, Sons & Co., Ltd.

It is of interest to note that part of the refrigerated space is to be employed for the carriage of chilled meat in an atmosphere of CO_2 gas. For handling the cargo, electric winches supplied by Laurence, Scott and Electromotors, Ltd., have been installed, some of which are of 10-tons and the remainder of 7-tons lifting capacity. The electric windlass was supplied by Messrs. Clarke, Chapman & Co., Ltd.

The engine-room auxiliaries include over forty electrically driven pumps, &c., with motors ranging from ⅓ h.p. up to 90 h.p., while in addition there are nine 35-in. electrically driven circulating fans and five propeller-type fans in connection with the ventilation of the refrigerated holds.

For heating the accommodation spaces—the vessel carries twelve passengers in addition to the officers and crew—more than eighty electric heaters of Harland & Wolff's special make

The m.v. "Waiwera"

have been installed, while cabin and ceiling fans are also fitted throughout the accommodation. In addition to the complete system of electric bells and telephones, the latest type of Marconi wireless telegraph equipment is installed and there is also a Marconi "Echometer" sounding device.

The navigational equipment includes Kelvin, Bottomley and Baird compasses, a Siemens helm indicator and Triton loud-speaking telephones between the navigating bridge and the engine room, and also between the navigating and docking bridges.

The National Electrical Convention

To be held at Folkestone in June, 1935

WE are officially informed that the Incorporated Municipal Electrical Association, at an extraordinary general meeting held on September 19th, agreed to the holding of a National Electrical Convention in 1935. The subject is referred to in our leaderettes to-day. The electrical associations embraced in the organisation of the Convention include:—

The Provincial Electric Supply Association.
The Incorporated Association of Electric Power Companies.
The London Electric Supply Association.
The British Electrical Development Association.
The Electrical Contractors' Association.

In addition to these there will be represented at the Convention:—

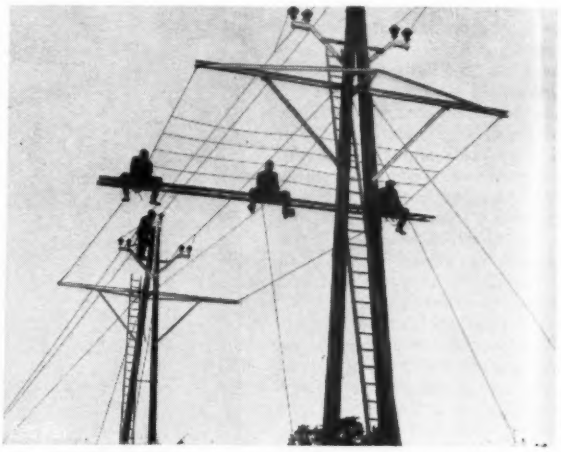
The Electrical Association for Women.
The British Electrical & Allied Manufacturers' Association.
The Institution of Electrical Engineers.
The Electrical Wholesalers' Federation.
Representatives of the Electricity Commissioners, the Central Electricity Board and other Government Departments.

At a meeting of the responsible committee of the Incorporated Municipal Electrical Association, upon which are co-opted representatives of the three power company associations, the Electrical Contractors' Association, and the British Electrical Development Association, it was unanimously agreed that the President of the Incorporated Municipal Electrical Association, Mr. E. E. Hoadley, M.I.E.E. (electrical engineer and manager, Maidstone Corporation), be President of the National Convention, and that the secretary of the Incorporated Municipal Electrical Association, Mr. J. W. Simpson, F.I.S.A., F.S.S., be the general secretary.

It was also agreed to accept the invitation of the Mayor and Corporation of Folkestone to hold the Convention at Folkestone during the week commencing June 17th, 1935. An electrical exhibition will be held in the Marine Gardens there.

It is hoped that by the holding of this, the first National Electrical Convention, a great impetus will be given to the electricity supply industry. Further details will be published later.

The offices of the general secretary are at rooms 503/5, Australia House, Strand, London, W.C.2.



Engineers at work connecting the Wooler (Northumberland) electricity supply cables with the Northern "Grid" system

Single-phase to Polyphase Conversion. By G. Windred

An effect of modern condensers

THE conversion of single-phase into polyphase current is considered in a recent article by Dipl.-Ing. Peter Glebow in the *Elektrotechnische Zeitschrift*. Steinmetz developed two systems of converting single to polyphase current which have been used for the starting of polyphase motors from a single-phase supply, but the conditions for complete symmetry of all three phases were not considered. Such conditions are obtainable by the use of condensers, but at that time their cost was prohibitive and their performance unsatisfactory. In the last few years cheap and efficient condensers have been built.

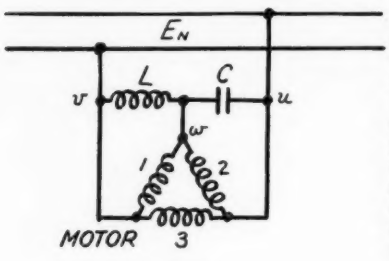


Fig. 1

A method of operating a polyphase induction motor from a single-phase supply is shown in fig. 1, in which an inductance L and capacity C are connected to the mains and provide a point of connection for one terminal of the polyphase motor, the other two terminals of which are connected to the mains. The motor is represented as a delta-connected machine, but the method is equally applicable to star-connected motors.

For the purpose of analysis, the circuit can be represented as shown in fig. 2, in which the respective motor phases are regarded as composed of inductances L1, L2, L3, corresponding to idle power, and resistances R1, R2, R3, corresponding to active or useful power. The third motor phase has no effect upon the distribution of currents and voltages in the other phase windings, as will be easily seen.

The circuit conditions can be conveniently represented by the vector diagram of fig. 3. The active current I_{R1} and the idle current I_{L1} compose the phase-current I_1. Addition of the current I_L in the external inductance, and in phase with I_{L1}, gives the current I. The current-diagram for phase 2 is constructed in the same manner, but with the condenser current I_C opposite in phase to I_{L2}. The voltages E_1 and E_2 are in phase with I_{R1} and I_{R2}, respectively. From the current-diagram the following conditions for symmetry are established:

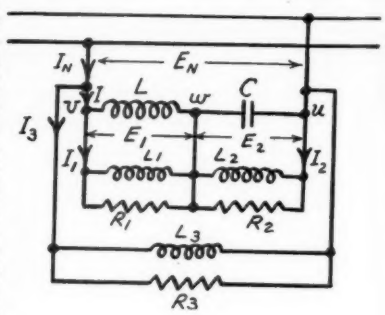


Fig. 2

$$I_L = I_l\left(\cos\phi - \frac{\sin\phi}{\sqrt{3}}\right),$$

$$I_C = I_l\left(\cos\phi + \frac{\sin\phi}{\sqrt{3}}\right),$$

where I_l is the motor line current, $= \sqrt{3}.I_{ph}$, for Δ-connection.

Similar considerations apply to the use of a polyphase machine as a generator of single-phase current, and to the calculation of the equal loading conditions.

Test results on a three-phase motor operating from a single-phase supply compare favourably with those corresponding to normal three-phase operation, and show a power-factor which remains high over a wide range of load. The outstanding advantages of this method are that the starting operation is entirely automatic, requiring no auxiliary apparatus such as centrifugal switches, and the machine is of robust polyphase construction.

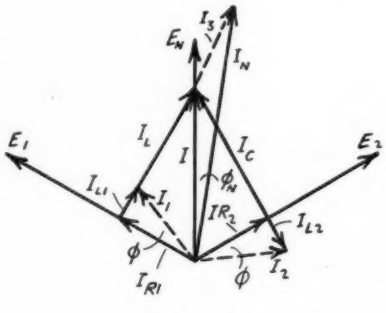


Fig. 3

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

Recruiting the Men

I was extremely interested in your leading article on this subject in last week's ELECTRICAL REVIEW.

By all reports Mr. Fleming has carried out some splendid work in connection with the training of young men and has given to the world at large his experience in this direction, but I have been long enough in the industry to fear that his lead will not be followed to any great extent in this decade.

I believe Mr. Fleming has been fortunate in that he is operating on a large scale in a firm employing many thousand hands, but statistics show that two-thirds of engineering employés work in factories employing fewer than 1,000 persons and one-third in factories of more than 1,000 persons, the average number of persons per factory being as low as forty-five.

In how many of the smaller factories is it possible to find a man whose sole duty it is to study the training of entrants to the industry or to display an interest in their welfare, or to provide that sound advice you advocate? I am afraid that in many large firms of otherwise high repute you would find that work of this nature, if it is done at all, is left as a side line to a man having other tasks, and day-by-day commercial duties then take precedence over training methods and matters.

In these quarters college students are not welcomed, although they are sometimes accepted as a source of cheap labour and sometimes because it is the thing to do. Rarely is any intelligent interest displayed in their work or is encouragement given to them. To be quite fair, no greater interest is displayed in those lads coming straight from school who may never have the opportunity of a college training, but many of whom possess real ability which could be properly directed. The wastage to industry as a whole must be enormous.

My first reaction to your leading article was to hope your comments on Mr. Fleming's paper would not pass unnoticed so that those in charge of industry would some day realise there is something in "this training business" and depute "someone" to do something about it. I concluded, however, it would not be by the exercise of foresight that this would be achieved, but rather by the visual results in the future of Mr. Fleming's carefully planned efforts and those of his fellow workers.

On second thoughts I am compelled to admit, in the face of statistics of more kinds than one, there might be difficulties in the adoption wholeheartedly of training schemes throughout the industry, and there must be some great fundamental change in the conduct of industry, and certain social changes, before there will be any considerable advance in this direction.

London, S.E.3, *September 24th.* H. F. YELLAND.

A Slot-meter Problem

The other evening I happened to be in a house which is lighted by electricity supplied through a shilling-in-the-slot meter. Suddenly the light went out. Then followed the usual search for a shilling, which was found after a few moments by the aid of candles. The inconvenience caused was inconsiderable and probably no more than the lack of foresight shown by the householder really deserved. What struck me as important, however, was the exclamation of our hostess—a nervous woman—at the shock of being left *suddenly* in the dark. She told us that she always dreaded this happening when her husband was out, and went on to say that she knew of other women whose circumstances would commend the use of a slot meter to them but who would not have one lest they should have the nervous shock of being left suddenly in the dark. She praised the gas slot meter, as it always gave ample warning. I explained that if gas went out altogether it would be dangerous in a way that electricity was not, and so the warning of dim burning was necessary for gas, but it occurred to me that the same principle might be applied to electricity for the benefit of nervous people. Why not when the shilling's worth of electricity was exhausted, or very nearly exhausted, insert a small reactance (where an a.c. supply is given) instead of permitting sudden darkness? The reactance need be only a small one to make the light too poor to be useful, but I have not heard that this has been done. The experiences of other readers or of meter manufacturers would, I think, be of general interest, as it seemed to me that here was a psychological factor of which nothing much has been heard.

TENEBRIS.

September 25th.

Lighting Service

Your correspondent "Consumer" (ELECTRICAL REVIEW, September 21st, p. 376), who it is noted is described as "domestic," is contributing nothing new in stating that intelligent fitting design is more economical than more expensive designs which are built as part of the construction of a room.

Lighting, besides being a necessity and a service, is also a commodity that is sold according to the extent to which it meets particular requirements, thereby assuming a certain value. There are many ways of assessing this value. A system which is totally unsuited to domestic purposes may be very desirable in, for example, parts of a theatre. Here its decorative value must be apparent, otherwise such illumination fails to appeal and is therefore inefficient. In the Architectural Lighting Studio much has been achieved in a minimum of space, and no claim is made that any particular system has been designed purely for domestic requirements, this subject being covered in the Bureau's Home Lighting Studios.

R. O. SUTHERLAND, A.R.I.B.A.,
Architectural Department, Lighting Service Bureau.

London, W.C.2, *September 22nd.*

Electrical equipment plays an important part at the Hairdressing Fair now in progress at Olympia, where Messrs. Halliwell & Co., Ltd., L. G. Hawkins & Co., Ltd., and I. Calvete are prominent electrical exhibitors **(See page 424)**

The Status of the Consumers' Engineer

It was with considerable surprise that I read the letter by Mr. J. Lesser in this week's ELECTRICAL REVIEW (September 21st, p. 376). He states that he does not consider it necessary for a salesman to have any electrical knowledge; further, that a salesman with any knowledge of engineering is unlikely to make good at his particular work.

As his letter makes reference to my original communication I presume that he suggests that the special examination proposed by me is not really necessary. In the first place I am unable to detect any reference whatsoever to a "salesman" in my letter. There is a world of difference between a sales engineer and a salesman. The "engineers" to whom I refer are individuals who are employed for the purpose of answering consumers' technical questions, estimating, and supervis-

ing the carrying out of any work connected with the application of electricity to domestic purposes. This work necessitates a great deal of practical and theoretical knowledge which, as I have suggested, is worthy of some recognition.

Irrespective of whether a salesman sells vacuum cleaners on commission only or whether he is a "pukha" salesman employed by some electrical supply undertaking, I maintain that the greater his actual knowledge of electricity the more value he is as a salesman of electrical goods. The consumer of to-day is comparatively technically minded and is quite likely to ask a number of really technical questions. Further, he expects to be able to obtain a reply from any sales representative of an electrical firm. In any case I doubt if there are many employers who would engage a man for a real salesman's job if he had had no previous experience of their particular class of goods.

At the same time I am fully prepared to admit that there are many salesmen in the industry who have practically no technical knowledge; this is one of the real reasons why development has not taken place at its proper rate.

The second suggestion was that a salesman with electrical knowledge was likely to be hampered by it. Surely Mr. Lesser does not suggest that a salesman should refrain from any attempt at increasing his knowledge of the goods he is selling.

London, W., *September 21st.* J. RUSSELL HICKMOTT.

The statements made in Mr. J. Lesser's letter of the 15th inst. regarding salesmanship are misleading. For instance, a first-class salesman for soap would undoubtedly be a failure selling electricity. Therefore the statement that a first-class salesman can sell anything cannot be taken seriously.

One of the fundamentals of selling is knowing the goods intimately. Further, it is very necessary for the consumers' engineer or salesman to have engineering knowledge beyond the merest elementary acquaintance, for the very good reason that householders look to these men for advice on all electrical matters (faults included). To lose the householder's confidence is to lose business.

The statement made in the penultimate paragraph of Mr. Lesser's letter that salesmen are born is a fallacy. There never was a born salesman, no more than a born engineer or a born blacksmith. A man may be born with capacities which if cultivated and trained will make him a salesman. Undeveloped capacity, however, is useless, and capacity without training is like a ship without a helmsman. A man must train for his particular job. It comes to this: a salesman after he is born has to be made. Surely what we want in the supply industry are salesmen with a good engineering training.

Bury, *September 24th.* WILLIAM F. JARVIS.

Demonstration Cabinets

As a responsible company of electrical installation contractors we are doing our share in educating the public to understand the necessity of good installation work, which carries with it a guarantee of such important items as earthing and bonding.

We are wondering, however, what success we can honestly expect to meet with such diverse trades as fruit canners, restaurant proprietors, silk stocking manufacturers (who all readily admit that they have no knowledge as to whether a watt is square or a volt is round) when we find members of the electrical industry themselves cheerfully distributing demonstration cabinets made of steel and equipped with two-pin plugs and sockets.

I have in front of me at the moment one of E.L.M.A.'s demonstration cases which is constructed throughout of steel. Inside this steel box is a gramophone motor and approximately a dozen lamp holders, and the box of tricks is made alive by plugging in a 2-A two-pin plug and socket. It is of small moment that the plug top itself has only one screw to hold the fibre plug pins on to the wood-top. A more serious aspect is that it would be the easiest thing in the world to get one pin in the socket and the other pin earthing on to the case. Further, if this case is being demonstrated in a room with tiled floor or other such material as makes the Institute demand insulated switches, I am sorry for the operator should this demonstration kit have an earth on it.

We know all about the old proverb of the cobbler's children being the worst shod, but surely the representative lamp organisation of this country should be more cognisant of the requirements of safety and good practice than to issue a piece of equipment under these circumstances.

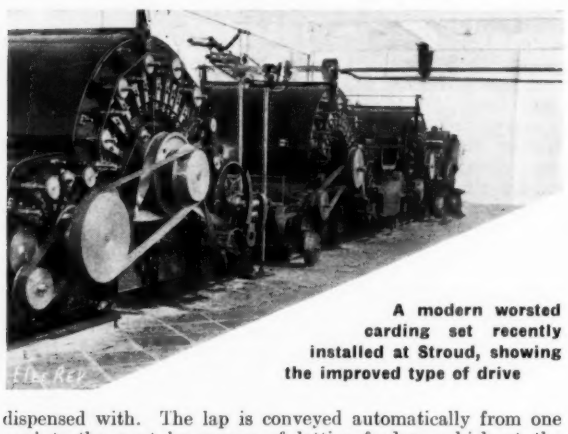
E.L.M.A., of course, are by no means the only defaulters, but I take this instance so to draw attention to a rather paradoxical position. MORTIMER, GALL & CO., LTD.,

J. MORTIMER HAWKINS, *Managing Director.*

London, *September 19th*, 1934.

Driving Worsted Carding Engines

IT has been customary in this country to drive woollen and worsted carding engines from line-shafting. These machines, which have to carry out the important function of equalising, lapping, and producing the rovings, are usually composed of two or three machines, namely, a breaker with intermediate and finishing or condenser cards. In the case of two-card sets for coarser yarns the intermediate card is dispensed with. The lap is conveyed automatically from one card to the next by means of lattice feeders, which at the same time do the work of lapping.



A modern worsted carding set recently installed at Stroud, showing the improved type of drive

It is essential that a constant speed shall be maintained on all three cards; *i.e.*, there must be no displacements between the movements of any one of the individually driven machines otherwise the roving will be uneven in thickness, only quite small quantities of fibre being carried to the dividing bands of the stripper for building up the roving. The different machines comprising the set of cards must also start and stop uniformly and keep in absolute step to prevent the fleeces between the cards from breaking. Hitherto this has proved impossible. With shaft drive interference between different sets of cards is transmitted as well as belt slip; the power requirements of the three cards vary, and individual drive has also not been satisfactory in the past because there has been no efficient means of ensuring absolute synchronous speed between three motors.

A patented drive for such carding engines comprises two or three a.c. slipring motors which are connected to the card cylinder shafts by means of chain drive. The motors are themselves connected together electrically so that it is only possible for them to run in synchronism. This arrangement also ensures that the motors start, accelerate, run, decelerate, and stop in unison. The switchgear controlling the three motors may be mounted on a wall or adjacent to the cards, and is operated by means of one single push button, which controls the starting and stopping of the three motors. Arrangements are made so that either of the motors may be run individually, if required, or reversed for grinding.

Other advantages of this form of drive are that no overhead shafting or belting is necessary, greater output with absolute uniformity of the slivers is procured, with better lighting and more efficient supervision. The illustration shows one of the latest card sets installed at the mills of Messrs. Strachan & Co., Ltd., Stroud. The electrical gear was supplied by Sloan Electrical Co., Ltd., Bristol, and the installation was carried out by Mr. R. F. S. Howell, Stroud.

Educational

A new scheme of Sandwich training in civil and mechanical or electrical engineering commences in October at the Woolwich Polytechnic. Students will be of senior national certificates or intermediate B.Sc. standard at entry. The course covers two years with three periods of eight weeks per annum studying full-time at the Polytechnic, the remainder being occupied by works training. Many prominent local works are co-operating in the scheme, amongst which are Messrs. Siemens, Stones, Harland and Woolf and the Standard Telephones and the Royal Ordnance Factories. The Principal, Dr. E. Mallett, M.I.E.E., acts as head of the Electrical Engineering Department with Dr. W. A. Scoble, Wh.Sc., M.I.M.E., head of the Civil and Mechanical Engineering Department.

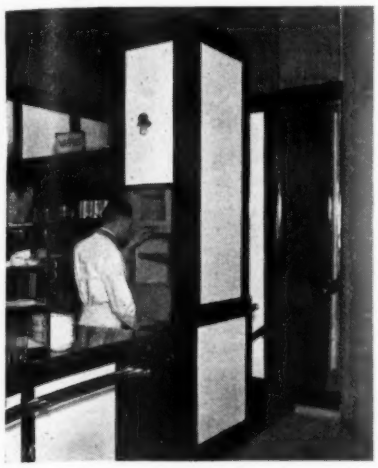
A course of lectures on "Loud Speakers and Acoustic Problems," by Mr. N. W. McLachlan, commences at the Borough Polytechnic on October 3rd. Each lecture will be preceded by a lecture on the mathematical work associated therewith.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

A Redesigned Service Lift

We are informed by MESSRS. MARRYAT & SCOTT, LTD., 75, Clerkenwell Road, London, E.C.1, that their "Utilift" has now been redesigned. This model is an automatic electric service lift supplied as a complete unit with a self-supporting tower, enclosure, shutters and serving boards. Instructions are given with the equipment for installation of the lift by any mechanic.



The redesigned Marryat & Scott "Utilift" installed in a London restaurant

The ingenious shutter has an automatic serving board which is in position when the shutter is open, but as soon as it is closed the serving board folds away, thus making possible a considerable saving of space. The "Utilift" can be erected in the middle of a room as it does not need the support of walls, and the entrances can be on any side or sides. Its principal use is in private houses where the kitchen and dining rooms are on different floors. The cost of the lift is low and in running it is less expensive than an electric iron. Being operated by a single push-button control it is simple and safe in use.

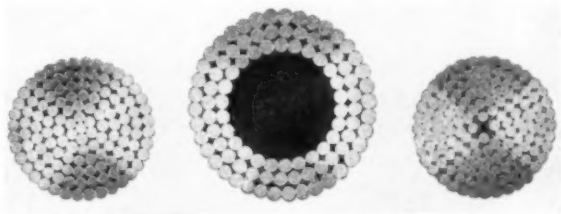
Reducing Skin Effect

With a.c. at very high frequencies the current in a conductor is practically confined to the surface, due to skin effect. At ordinary frequencies the effect is one of unequal distribution of current density, this being less at the centre than at the surface. As a non-uniform distribution of current density increases heat losses, the result of skin effect is a greater resistance with a.c. than with d.c. The explanation is that the magnetic field within the conductor produces an inductive e.m.f. which is greater at the middle than at the surface, because the total field enclosing the centre is the greater.

It follows that the current density will diminish from surface to centre, and also alter in phase. Another way of regarding it is to imagine the conductor divided into filaments of equal area. As the self and mutual inductions of all filaments will not be equal, so the currents in the different filaments will also be unequal. The effect increases with increase of conductor section, and with frequency. Normally the effect becomes of importance with single conductor cables of 0.75 sq. in. and over.

It has been customary to build large conductors with rope cores, but unless the core is over 1 in. in diameter only a moderate reduction of resistance is obtained. To effect a substantial improvement means a large and expensive cable. A solution of the difficulty is obtained by using small-diameter wires insulated from each other and so interwoven that each wire follows a similar path throughout the length. This method of construction is costly for ordinary purposes.

A novel method of construction for reducing the skin effect of large sizes of single conductor cable has been developed by Mr. Humphreys Milliken, of the Montreal Light, Heat and Power Consolidated, and BRITISH INSULATED CABLES, LTD., have filed an application for a British patent. In this construction the conductor is built up of three or four sectors which are separately and lightly insulated. The sectors are then laid up together to form a circular cable and insulated and lead sheathed in the usual manner. The skin effect is reduced to the value it would have for a section of one-quarter to



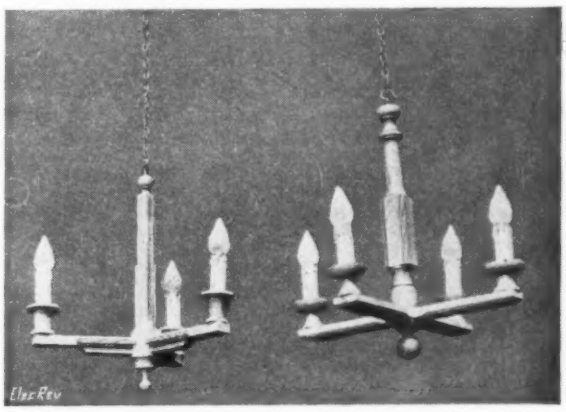
A comparison between cables of similar carrying capacity with (a) ordinary circular conductor, (b) rope-cored conductors, and (c) segmental conductor

one-third of the conductor, owing to the equalising of the reactance of a large number of the individual wires by their transposition in each sector.

The overall diameter of the cable is only very slightly greater than that of an ordinary single-core cable, and considerably less than the overall diameter of a cable with a rope core. The "Milliken Segmental" type cable is claimed to have all the advantages of a rope-cored cable without its disadvantages and can be supplied at a slightly lower price.

Oak Pendant Fittings

We have inspected a number of light oak pendants of new design available with blue, green, pink or silver mould-



Two of the Belgrave pendants

ing. These pendants have recently been introduced by the BELGRAVE ELECTRIC CO., 24, Belgrave Road, London, S.W.1, and two of them are illustrated above. In each case the price, wired and fitted with candles, is £2 10s.

The Gordon Armature Tester

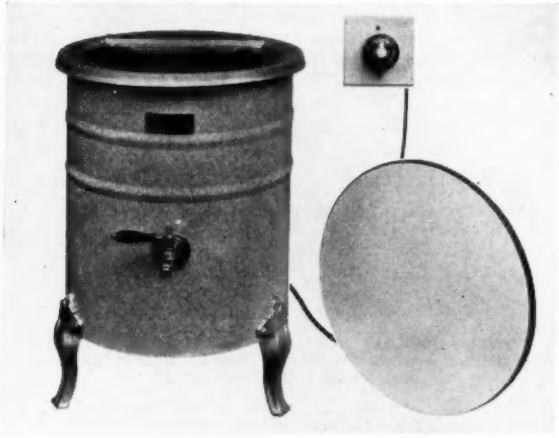
The armature tester known as the "Prüfex" which has been introduced by F. J. GORDON & CO., LTD., 114/116, Euston Road, London, can be connected to a plug-socket on mains of any voltage between 100 and 250. The armature to be tested is placed upon the exciting magnet and the small detecting magnet provided with the headphones is placed upon a two-pole armature in an upright position. In the case of four or more pole armatures the detecting magnet is held against the armature horizontally.

One part of the windings of the armature should always be positioned between the two poles of the exciting magnet, while the detecting magnet should be placed upon the iron core of the armature at the other part of the windings. During the examination the armature is rotated until it has been examined over the whole circumference. Only the brushes must be lifted off. If the armature is faultless a uniform faint buzzing sound will be heard over the whole circumference, otherwise a very loud sound will be audible in the headphones at the source of the fault.

Short-circuit in the collector will be noticed twice in the case of a two-pole armature, four times in the case of a four-pole armature, &c., the loud sound always appearing where the coil is shorted to the faulty collector segment. A short-circuit in the windings can be detected twice in case of a two-pole armature and once in the case of a four-pole armature. The

Testing an armature by means of the Gordon "Prüfex" tester

special characteristic of a short-circuit between the two coils is that, in the case of a three-pole armature a loud buzzing sound will be audible almost over the whole of the armature, while in the case of multiple armature it becomes



The Siemens washboiler referred to in the article below

audible at every third or fourth slot, according to the winding pace.

Breaks are ascertained by shorting the associated collector segment with the aid of a conductor. In the case of triple-phase rotors or stators, the examination normally extends only to short-circuits in the windings. One coil after the other is examined, the exciting magnet being always placed upon one side, and the detecting magnet upon the other side of the coil. The same applies to a.c. motors of any other phase. It is only necessary to remove star, delta or parallel connections. Only when testing slip-rings need the connection be removed.

The screw nut on the side of the firm's label must not be loosened or removed, as a short-circuit may result. The apparatus is applicable to practically any size of armature and the price of the complete equipment is 5 gns.

Hotpoint Fires

The HOTPOINT ELECTRIC APPLIANCE CO., LTD., 24, Newman Street, Oxford Street, London, informs us that it is introducing three new fires known as the "Queensway Victor," the "Nelson," and the "Hexagon." The first-named is simply designed and is of the reflector type, costing £1 12s. 6d. A tubular frame is used, and the reflector is adjustable for angle.

The "Nelson," which is a 2-kW fire priced at £2 10s., is of an attractive modern design, finished in chromium plate and equipped with three cast-iron feet and an insulated drop-down handle.

The Hotpoint "Hexagon" fire

The model illustrated is the "Hexagon," which is simply but robustly constructed, and is 11s. 6d. in jade green or blue enamel, or 14s. 6d. in chromium plate.

Some "Xcel" Appliances

FOR this winter SIEMENS ELECTRIC LAMPS & SUPPLIES, LTD., 38/39, Upper Thames Street, London, E.C.4, has introduced six new fires. A swivelling bathroom model with aluminium end-plates and a chromium-plated reflector has a guard in front of the elements and a pull cord is used for controlling the angle of the reflector. No switch is fitted as the makers recommend the use of a separate switch, either controlled from another room or by a ceiling switch and pull cord. The price is £2 5s.

As a companion to the "Buxton" a new reflector fire costing £1 9s. has been introduced. It is also rated at 1 kW and is finished in sprayed oxidised silver with a chromium-plated reflector.

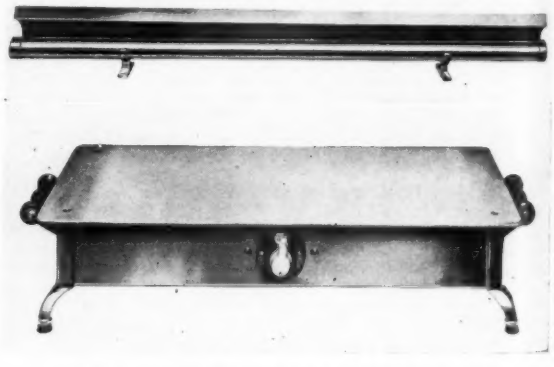
The Company is making an inset fire with a recess depth of 2¾ in. and projecting 1¾ in. and costing 27s. (oxidised copper or silver) or 29s. (vitreous enamel) for the 2-kW size, and 21s. and 23s. when fitted with a 1-kW element. A switch is provided for each element and the fires are made of cast-iron.

Another new-comer is the "Floodlit" fire. A lamp set in a reflector beneath the glass panel throws an upward beam of light of any desired colour on to the face of the fire. Polished aluminium and chromium-plated facings with chromium-plated reflectors are supplied as standard and a choice of matt gold, green, silver or black is offered for the general finish.

The "Raglan," which is also new, has a moving flame effect with double-flicker action. There is a 2-kW element, and the fire costs £3 12s. 6d. in sprayed oxidised silver or copper.

The plate warmer in polished aluminium with a heavy gauge solid matt-finished aluminium top-plate, and heat insulated handles and feet, is a useful appliance. Four sizes are obtainable (225 W to 600 W) priced at from £2 17s. 6d. to £7 5s., all but the smallest being provided with three-heat rotary controls.

The new shop window heater is loaded normally at 25 W per foot, which is generally sufficient to prevent moisture forming on the windows, but if ordered specially a loading of 40 W



The new Siemens plate warmer and window heater

per foot can be provided. Solid brass tubing of 1¼ in. dia. is used and the deflector directs the heat on to the glass. Two types are made, one of which has a rolled top edge and the other an inch-wide flange at the top suitable for signwriting or advertising matter. Sizes range from 2 ft. to 8 ft., and the prices from 21s. to 51s.

Vertical tube radiators are made with 3, 4, 5 or 6 tubes three feet high. They are loaded at 500, 750, 1,000 or 1,250 W. and cost £3 5s., £3 15s., £4 7s. 6d., and £4 17s. 6d. respectively.

Another new product is a wash-boiler with a solid copper container, a cast-aluminium top and a chromium-plated tap. The boiler is supplied with 4 ft. of 4-coil c.t.s. flex and a three-heat switch at a cost of £5 12s. 6d., and the total loading is 3.2 kW. The white vitreous enamelled detachable flat cover for use as a table-top can be obtained for an extra 7s. The general finish of the whole wash-boiler is in mottled grey enamel.

Four of the new fires: (left to right) the "Raglan," the bathroom fire, the "Floodlit" fire, and (above) the "Clifton"

Dutch Electrical Imports and Exports

FROM the Dutch official trade returns for the half year ended with June last we have compiled the appended tables showing the imports into and exports from Holland of electrical machinery and allied goods during the first six months of 1934 and 1933, from which it will be seen that the imports increased by £82,685, while the exports, mainly owing to the fall in radio material and vacuum cleaners, declined to the extent of £331,525. For purposes of comparison the Dutch figures have been converted to sterling at the rate of 7.5 guilders to the £.

IMPORTS.

	January—June. 1933. Quantity. Tons.	1933. Value £.	1934. Quantity. Tons.	1934. Value. £
Electrical machinery and parts	2,137	404,800	1,026	164,135
Telegraph and telephone apparatus and material	1,170	239,465	1,223	240,625
Radio—telegraph and telephone apparatus and parts ...	916	359,065	1,504	689,200
Incandescent lamps (No. of) ...	1,273,000	37,065	899,900	28,935
Arc lamps	14	1,600	3	1,200
Copper and brass wire and cable, not insulated	1,864	83,465	2,132	87,465
Electric vacuum cleaners (No. of)	37,950	170,000	24,660	131,865
Wire and cables, insulated ...	3,891	178,265	3,431	167,200
Bulbs for electric lamps ...	30	2,665	35	3,335
Other electrical apparatus ...	2,217	421,065	2,218	466,535
Total imports	—	£1,897,450	—	£1,980,135

It will be seen that there was a considerable shrinkage in electrical machinery imports, of which the bulk is credited to Germany (£68,800), followed by Sweden with £21,465, the United States £15,735, Belgium £12,400, Switzerland £10,535, and Great Britain only £8,535, the last figure contrasting with, as much as £235,335 in the first half of 1933. In telegraph and telephone apparatus the major portion of the trade is in German material followed by Belgium, the United States, Great Britain and Sweden in that order.

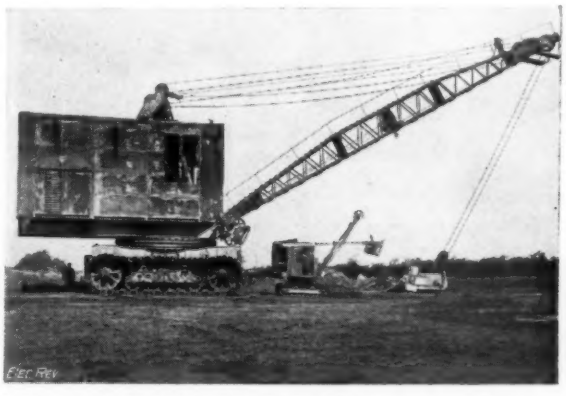
In view of the great development of the radio industry in Holland, one of the surprises of the table is the large increase in the imports of foreign material. Of the total Germany leads with £260,000, Great Britain being a close second with £203,465, followed by France with £67,200; smaller amounts came from Switzerland, Belgium, the United States, Hungary, Czechoslovakia, Sweden, Austria and the Saar. Of the incandescent lamps Germany supplied 511,400, Belgium 107,700, Sweden 30,500, Austria 30,300, and Great Britain 23,900. Of the vacuum cleaners—the total of which shows a big decline—16,537 came from Germany, 4,135 from Sweden, 2,138 from the United States, 1,529 from Gt. Britain, 368 from Denmark, and 120 from Italy.

The bulk of the insulated wire and cable came from Germany (2,777 tons), Belgium being second with 430 tons, with small quantities from Switzerland, Italy and Czechoslovakia. Great Britain does not appear in this section of the returns. Imports of unclassified electrical apparatus are largely in the hands of German manufacturers to whom 1,627 tons or over 73 per cent. of the total is attributed, the remainder being credited to Great Britain, Switzerland, the United States, Sweden, Czechoslovakia and France.

EXPORTS.

	January—June. 1933. Quantity. Tons.	1933. Value £.	1934. Quantity. Tons.	1934. Value £.
Electrical machinery	353	53,600	577	78,000
Telegraph and telephone apparatus and material	25	6,665	48	8,135
Radio, telegraph and telephone apparatus and parts ...	2,629	2,298,135	2,416	1,950,935
Incandescent lamps (No. of) ...	11,291,200	562,665	9,698,200	440,135
Arc lamps	27	3,735	27	5,335
Bulbs for electric lamps ...	501	52,265	523	56,400
Copper and brass wire, not insulated	4,483	21,600	658	28,400
Electric vacuum cleaners (No. of)	1,865	9,335	166	1,335
Wire and cables, insulated ...	2,347	106,000	2,292	94,335
Other electrical apparatus ...	437	123,600	564	193,065
Total exports	—	£3,187,600	—	£2,856,075

Returns are not so informative on the export side as they are as regards imports. In fact it is remarkable that while detailed information is given regarding the distribution of several relatively small items, no corresponding information



A 55-cu. yd. all-electric excavator (Ruston Bucyrus) standing with a ¾-cu. yd. machine **(See page 400)**

is given in relation to the two important items of radio material and electric lamp exports, which form by far the major portion of the Dutch shipments.

Germany and the Dutch East Indies are at present the largest buyers of Dutch electrical machinery. Palestine, Cyprus, Egypt, Syria, Argentina, the Dutch East Indies, the Irish Free State and Portugal in the order given were the best customers for uninsulated copper wire, while Great Britain, Belgium, France, and Denmark were the largest buyers of bulbs for electric lamps.

Employment in the Electrical Trade

SOME interesting facts relating to the electrical trade are included in the occupational tables of the 1931 Census of England and Wales which have now been published by H.M. Stationery Office (price £1 10s.). It will be remembered that a full review of the Census appeared in the ELECTRICAL REVIEW of May 11th, 1934, page 673.

Under the classification "Electrical Apparatus, Makers and Fitters (not elsewhere enumerated) and Electricians," 214,579 persons are recorded. The corresponding figure in 1921 was 139,954. There has thus been, during the ten-year intercensal period, an increase of over 50 per cent. in the number of persons normally occupied in the electrical trade.

Of the total, 8,135 are employers or salaried managers. The Registrar-General has discontinued the practice of giving separate figures for each of these two categories for, as he observes in the preface to the report, with the growth of joint stock enterprise the distinction between them has lost much of its significance. Further, 5,086 persons are returned as "working on their own account" (*i.e.*, independent craftsmen not employing any labour). The vast majority of these are classified as electrical engineers and fitters, electricians and wiremen.

The Census records 181,606 wage-earners in the electrical trade, and a further 19,752 persons (of all classes) who were out of work at the date on which the 1931 Census was taken.

The 181,606 wage-earners are classified in the accompanying table. It should be noted that the figures include skilled workers only.

Another section of the report provides an interesting index to the location of the electrical trade. The 214,579 persons normally occupied in the trade are distributed geographically as follows: Home Counties, 95,926 (68,455 in the Greater London area alone); Northern Counties, 60,584; Midland Counties, 38,980; Eastern Counties, 5,209; South-western Counties, 7,059; Wales, 6,821.

WAGE-EARNERS EMPLOYED IN THE ELECTRICAL TRADE.

Classification.	Number.
Foremen and overlookers	8,530
Accumulator makers and pasters	1,904
Coil winders	7,716
Coil insulators	472
Insulated cable and wire machine drivers and setters-up	3,410
Insulated cable and wire machine assistants	2,725
Electric lamp and valve-stemmers, sealers and exhausters	1,232
Filament, grid and anode makers and mounters	765
Inspectors, viewers and testers	7,918
Instrument makers and assemblers	15,975
Electrical engineers and fitters, electricians and wiremen	95,444
Linemen and cable jointers	25,118
Other skilled workers	10,397
Total	181,606

It is interesting to note the proportion of women occupied in the various branches of the trade. Of the total number of persons recorded (214,579) approximately 13 per cent. are women. The corresponding proportion in the employer-manager group, however, is only 1.5 per cent., and 2 per cent. in the case of persons returned as "working on their own account." There are 25,950 women wage-earners employed in the electrical trade, representing 14 per cent. of the total number of persons included in the wage-earner group. According to the Census statistics, women preponderate among the following classes of wage-earners: Coil winders, coil insulators, insulated cable and wire machine assistants, electric lamp and valve operatives, and filament, grid and anode makers and mounters.

The Canadian Electrical Industry

THE beginning of the current year showed signs of improving business in Canada, according to a report on the economic conditions in Canada by Mr. F. W. Field, C.M.G., H.M. Senior Trade Commissioner in Canada and Newfoundland, prepared for the Department of Overseas Trade and published by the Stationery Office at 4s. 6d. net.

Dealing with electrical power station developments Mr. Field states that the results of studies last year of the Dominion Water Power and Hydrometric Bureau of the Department of Interior indicate available water power in Canada totalling 20,347,400 h.p. under conditions of normal minimum flow and 33,617,200 h.p. ordinarily available for six months of the year. The total turbine installation is 7,332,070 h.p. In 1900 it was 173,323 h.p.

An analysis of the water-power plants scattered from coast to coast, concerning which complete data are available as to turbine installation and satisfactory information as to stream flow, shows the average machine installation to be 30 per cent. greater than the ordinary six-month flow power. On this basis, the figures quoted above indicate that the present recorded water-power resources of the Dominion will permit of a turbine installation of about 43,700,000 h.p. The present turbine installation indicates the development of only a little less than 17 per cent. of the present recorded water-power resources.

While no new undertakings of any considerable size had been initiated since early in 1931, the completion of two large central electric stations which had been under construction, together with a number of smaller plants mostly for mining purposes in British Columbia, provided an installation for the year 1933 of 270,210 h.p. This, in addition to 16,600 h.p. installed during 1932 but not included in the total for that year, brought the total hydro-electric installation of Canada to 7,332,070 h.p. as on January 15th, 1934. Construction work is now proceeding upon several large undertakings, and it is considered that this figure will be substantially added to in the near future.

Central electric stations, *i.e.*, organisations generating electricity for public distribution for industrial, municipal, commercial, domestic and agricultural uses, account for the larger part of Canada's hydro-electric installation. These organisations maintain a total installation of 6,380,691 h.p. or 87 per cent. of the total. A considerable proportion of the power generated by this installation is sold *en bloc* for the manufacture of pulp and paper, for the mining and reduction of minerals and for electro-chemical production.

Pulp and paper mills have an aggregate hydro-electric installation of 600,966 h.p. or 8.2 per cent. of the total. In addition, these and other pulp and paper mills have motor equipment for operation by hydro-electricity purchased from the central stations, aggregating more than 1,031,000 h.p. Large amounts of electricity are also purchased for use in electric boilers.

The third class, other industries, includes general industrial plants such as mines and mineral reduction works, electro-chemical plants, saw-, grist-, and grinding-mills, machine shops, municipal pumping plants and electric street railways. This group has a hydro-electric installation of 350,383 h.p. or 4.8 per cent. of the total and is also a large purchaser of power generated by the central electric stations. The average installation is 686 h.p. per 1,000 of population.

The predominance of water power for the purpose of generating electricity required by central electric stations in Canada is revealed by the last completed Census of Industry for 1931. More than 95 per cent. of the generating plant of central stations is driven by hydraulic turbines and produces more than 98 per cent. of the electricity sold in Canada. The Census also indicates the extent to which power purchased from the central electric stations is utilised by the general manufacturing industries. The total power equipment employed, made up of primary hydro and fuel power equipment operated by the industrial plants and of motors operated by purchased power, totalled 4,114,679 h.p., of which the motors operated by purchased power were rated at 2,587,411 h.p., this figure representing more than 62.8 per cent. of the total equipment.

Imports and Exports

In the returns of Canada's foreign trade in electrical goods for the financial year ended March last there is seen an accentuation of the tendencies already noted of imports to decline and exports to increase. Compared with 1932-33 the value of the imports of such goods from the United Kingdom fell by $316,000 to the low level of $538,000, while that of exports to the United Kingdom rose by $160,000 to $616,000, a balance in favour of the Dominion of $78,000. The decline in imports as a whole was almost entirely at the expense of Great Britain, the figure for the United States showing a small increase. The following statement gives details of nearly all the principal groups of apparatus for 1933-34, with notes of increases or decreases as compared with the preceding year.

IMPORTS

	1934. $.	Inc. or Dec. $.
Batteries, primary—		
Total	97,000	− 8,000
From United Kingdom	1,500	—
„ United States	96,000	− 6,000
Batteries, storage—		
Total	110,000	− 59,000
From United Kingdom	29,000	− 63,000
„ United States	80,700	+ 4,100
Heating apparatus—		
Total	69,000	− 109,000
From United Kingdom	700	− 600
„ United States	67,700	− 106,300
Dynamos and parts—		
Total	429,000	+ 242,000
From United Kingdom	21,400	− 2,500
„ United States	151,000	− 8,000
„ Switzerland	255,000	+ 255,000
Fans and motors—		
Total	11,600	− 5,700
From United Kingdom	1,200	+ 970
„ United States	10,000	− 7,000
Fuses, plugs and cut-outs—		
Total	56,100	+ 16,300
From United Kingdom	300	+ 200
„ United States	55,800	+ 16,100
Lamps, carbon filament—		
Total	18,800	+ 6,200
From United Kingdom	270	+ 170
„ United States	14,600	+ 8,500
„ Japan	3,700	− 2,100
Lamps, metal filament—		
Total	63,200	− 1,200
From United Kingdom	700	− 400
„ United States	49,400	+ 16,600
„ Japan	12,300	− 17,100
Torches, flashlights, side and tail lights—		
Total	330,000	+ 124,000
From United Kingdom	2,600	+ 500
„ United States	322,000	+ 139,000
„ Germany	1,700	− 7,700
„ Japan	1,100	− 8,000
Light fixtures and appliances—		
Total	177,000	− 11,000
From United Kingdom	13,000	+ 3,000
„ United States	150,000	− 10,000
„ France	1,300	− 2,000
„ Germany	2,600	− 3,500
Arresters, choke coils, etc.—		
Total	26,600	+ 9,400
From United Kingdom	300	+ 300
„ United States	26,100	+ 9,600
Magnetos for i.c. engines, manufacturers, and parts—		
Total (from Apr. 1, 1933)	7,900	—
From United Kingdom	500	—
„ United States	7,400	—
Meters, electric—		
Total	76,900	− 7,200
From United Kingdom	18,600	− 4,800
„ United States	56,200	− 3,800
Motors and complete parts—		
Total	683,000	− 195,000
From United Kingdom	128,000	− 41,000
„ United States	543,000	− 141,000
„ Sweden	6,200	− 11,500
Rheostats, controllers, etc.—		
Total	193,000	—
From United Kingdom	12,100	− 13,500
„ United States	174,600	+ 8,800
„ Switzerland	6,300	+ 5,300
Electric irons—*		
Total	17,900	+ 7,100
Lighting outfits—		
Total	1,600	+ 1,100
From United Kingdom	500	+ 500
„ United States	1,100	+ 600
Sockets, outlets, etc.—		
Total	34,800	− 14,200
From United Kingdom	1,100	+ 500
„ United States	33,500	− 14,500
Spark plugs, magnetos (other than above), etc.—		
Total	219,000	− 42,000
From United Kingdom	14,100	− 34,000
„ United States	203,500	− 5,500
„ Switzerland	800	− 2,900
Switches, switchboards and circuit-breakers—		
Total	344,000	− 60,000
From United Kingdom	40,000	+ 14,000
„ United States	302,000	− 67,000
„ Switzerland	100	− 400
Telegraphic apparatus—		
Total	92,400	+ 67,100
From United Kingdom	2,600	− 2,100
„ United States	89,600	+ 69,500
Telephone apparatus—		
Total	208,000	− 159,600
From United Kingdom	29,800	− 19,200
„ United States	177,000	− 139,000
Transformers and complete parts—		
Total	47,400	− 246,600
From United Kingdom	12,000	− 231,000
„ United States	34,500	− 16,600
Radio tubes—		
Total	97,700	+ 36,200
From United Kingdom	200	− 5,200
„ United States	97,400	+ 86,300
Radio and wireless apparatus—		
Total	1,308,000	+ 265,000
From United Kingdom	63,600	+ 27,600
„ United States	1,244,000	+ 239,000
„ Germany	300	− 500
Turbo-generator sets, 700 h.p. of a kind not made in Canada—		
Total	96,000	+ 75,300
From United Kingdom	85,950	+ 80,850
„ United States	10,000	− 4,100
„ Switzerland	60	− 1,440
Electric apparatus, n.o.p.—		
Total	1,059,000	− 80,000
From United Kingdom	57,000	− 28,000
„ United States	981,000	− 40,000
„ Germany	3,200	− 4,500
„ Switzerland	14,800	− 6,600
Total of electrical apparatus, lamps and fixtures—		
Total	5,915,000	− 134,000
From United Kingdom	538,000	− 316,000
„ United States	5,036,000	+ 7,000

* Nearly all from U.S.A.

EXPORTS

	1934. $.	Inc. or Dec. $.
Batteries, storage—		
Total	165,000	+ 43,000
To New Zealand	33,800	− 2,800
„ Argentina	64,000	+ 34,000
Batteries, other—		
Total	81,000	+ 18,000
To United Kingdom	12,100	− 10,000
„ New Zealand	61,500	+ 27,700
Telegraph, telephone and radio apparatus—		
Total	410,000	+ 189,000
To United Kingdom	248,000	+ 140,000
„ Australia	32,000	+ 27,600
„ New Zealand	36,000	—
„ Brazil	47,000	+ 17,000
Dynamos, generators and motors—		
Total	56,000	+ 10,000
To United Kingdom	50,100	+ 18,600
Domestic cooking and heating devices—		
Total	661,000	+ 271,000
To United Kingdom	42,000	− 1,000
„ Irish Free State	115,000	+ 100,000
„ South Africa	431,000	+ 157,000
„ New Zealand	32,000	+ 1,000
Spark plugs, magnetos, etc.—		
Total	432,000	+ 90,000
To United Kingdom	226,000	+ 16,000
„ South Africa	36,100	+ 17,300
„ Australia	62,000	+ 26,900
„ New Zealand	25,400	+ 8,100
Electrical apparatus, n.o.p.—		
Total	220,000	+ 61,000
To United Kingdom	37,200	− 4,200
„ Brazil	20,200	+ 7,300
„ Chile	23,000	+ 23,000
„ Mexico	45,000	− 1,000
Total of electrical apparatus exported	2,024,000	+ 676,000
To United Kingdom	616,000	+ 160,000
„ United States	19,000	− 16,000

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations and Failures

Employment During August

Employment in the engineering industry during August showed little change as compared with the previous month. According to statistics published in the *Ministry of Labour Gazette* the number of unemployed in the engineering industry totalled 133,982, an increase of 2,276 as compared with the preceding month, the percentage rising from 13.8 to 14.0 (in August, 1933, the figure was 22.5 per cent.). In the electrical engineering section the number of unemployed was 6,551, the proportion falling from 7.4 to 7.2 per cent. (14.2 per cent. in August, 1933). In the electric cable, apparatus and lamp manufacturing group the number of unemployed was 9,468, the percentage falling from 8.2 to 7.5 (16 per cent. in August, 1933). Unemployment in the electrical wiring and contracting industry also showed a decrease at 4.902, the percentage being 17.8 against 19.2 (17.3 in August, 1933).

A Birmingham Centenary

The centenary of the opening of the Town Hall, Birmingham, is to be officially celebrated on October 4th next, and during the week of the celebrations the Electric Supply Department will floodlight the Town Hall, the balcony of the Council House, and the tower and west end of St. Philip's Cathedral Church.

Trading with British West Indies

A confidential memorandum containing hints for commercial visitors to and information regarding methods of trading in the British West Indies has been issued by the Department of Overseas Trade to firms whose names are entered on its special register. United Kingdom firms desirous of obtaining a copy of this memorandum should apply to the Department, 35, Old Queen Street, S.W.1, quoting reference number C.Y.4348.

Plant for Johannesburg

The Johannesburg City Council at a recent special meeting decided to accept the tender of the British General Electric Co., Ltd., for one 15,000-kW turbo-generator, condensing plant and foundations, at £47,086, including spares. In making the recommendation the Tramway and Lighting Committee reported that the lowest offer, that of the Skoda Works of South Africa (Pty), Ltd., at £37,400, could not be accepted, as the concrete mat below the foundation block of the machine would foul the foundations of the turbine house, and in addition the arrangement of the plant was not in accordance with specifications. The second and third lowest also did not meet requirements. Seven tenders in all were received from Great Britain, Germany, Sweden and Czechoslovakia. The difference between the lowest tender and that of the British General Electric Co. caused some discussion. It was stated that the Skoda Works were prepared to meet the Council regarding the technical objections raised. On the other hand, it was pointed out that it was an accepted principle that the Council, in placing contracts, should give a preference first to articles of South African manufacture and then to those of Empire manufacture, while it was strictly laid down that tenders must be according to specification. The tender was accepted by eighteen votes to three. The plant is required for the Jeppe Street power station. It is learned that another turbo-generator set of similar capacity will have to be installed at a much earlier date than was anticipated, owing to the rapid increase in the demand for electricity.

Trade Commissioner's Visit

The Department of Overseas Trade announces that Mr. C. Kemp, H.M. Trade Commissioner at Nairobi, is at present in this country on an official visit. Mr. Kemp will be available at the Department of Overseas Trade for the period October 2nd-5th for the purpose of interviewing manufacturers and merchants interested in the export of United Kingdom goods to British East Africa (Uganda Protectorate, Kenya Colony and Protectorate, Zanzibar and the Tanganyika Territory), after which he will visit a number of industrial centres in the provinces. Firms desiring an interview with Mr. Kemp in London or information regarding his arrangements to visit provincial centres should apply to the Department, 35, Old Queen Street, S.W.1, quoting reference 4493/1/1934.

A Copper Conference

It is reported that an International Conference of World Copper Producers may be held in New York early in October, when M. Pisart, a director of the Union Miniere de Haut Katanga, is expected to arrive. It is regarded as likely that his arrival will be considered an appropriate time for a meeting of world producers to discuss the possibility of reaching some sort of agreement on production and marketing. While

The "Northmet's" Largest Showroom

WHETHER the consumer is interested in electric lighting, heating, cooking, refrigeration or water-heating, ample provision has been made at the new "Northmet" Wood Green showrooms to demonstrate the apparatus to him. On the ground floor of the new premises, which were opened last week, is a large general showroom containing a varied array of small equipment such as irons, fires, clocks and lighting fittings, while in an annexe to this is an exhibit containing an electric geyser and electrically heated towel rails artistically laid out in a marble panelled bathroom. In another room is a large kitchen containing many types of electric cooking equipment, washers and refrigerators; demonstrations, open to the public, are given every Tuesday.

The top floor is approached by a Marryat & Scott lift. On this floor there is a lecture theatre provided with a stage and capable of seating about a hundred people. The lighting is partly of the concealed cornice type, partly from the skylight and also semi-indirect from wall brackets, the total loading being 7.46 kW. Six 3-kW "Thermovent" heaters and a 3-kW "Magicoal Plus" fire maintain the room at an equable temperature.

The heating of the rest of the building is by hot water, the thermal storage plant, which is situated in the main store room in the basement, being provided by Richard Crittall & Co., Ltd. The vertical storage tank has a capacity of 1,600 gallons, and is fitted with two thermostatically controlled banks of G.E.C. withdrawable elements loaded at 25 and 50 kW and balanced over three phases. The control gear, made by the Watford Switchgear Co., incorporates triple-pole contactors. Outside the building are neon signs advertising the "Northmet Electricity Offices."

The contract rate in Wood Green is ½d. per kWh in summer and 1d. in winter, and Capt. J. M. Donaldson, speaking at the opening ceremony of the showroom, said that since January, 1933, when the "Northmet" Co. took over the undertaking the number of consumers had risen from 5,000 to 7,000. He hoped that with the opening of the new showroom an even larger increase would be shown during the next eighteen months.

The "Northmet" showrooms at Wood Green: (Left to right), the demonstration kitchen, an exterior view, and the bathroom exhibit

it is conceded that discussions are likely to take place, it is felt that the complexity of the problem, as well as various trade reflections which have to be considered, would tend to make such an agreement exceedingly difficult.—*Reuter* (New York).

South African Customs Investigations

A Customs Tariff Commission has been appointed by the South African Government to investigate the Customs duties. It will inquire into the effect of the existing tariff on the development of the Union's secondary industries, investigate the principles on which protection has been granted to industries and the extent to which it is necessary to maintain, lower or raise the present scale of duties; and the extent to which it is feasible to differentiate between revenue and protective duties. The chairman is Dr. J. E. Holloway, Financial Adviser to the Treasury.

Wages in the Cable-making Industry

The Joint Industrial Council for the Electrical Cable-making Industry announces that there will be no "cost-of-living" alteration in wages paid in the industry on the third pay-day in October.

New Zealand Electrical Imports

New Zealand's imports of electrical machinery and equipment during the first six months of the current year totalled £350,005 in value, as compared with £331,543 during the first half of 1933, and of wireless apparatus £138,410 as against £125,840.

The Halifax Electrical Exhibition

An exhibition of electrical appliances was inaugurated by Sir Felix J. C. Pole at the Marlborough Hall, Halifax, on September 19th, arranged jointly by local registered electrical contractors and the Borough Electricity Department. Prior to the ceremony a representative party was entertained to lunch by Mr. M. F. Farrar, of M. F. Farrar & Co., Crossley Street, who was chiefly responsible for the initiation and promotion of the exhibition. The luncheon party included the Mayor (Councillor F. A. Leach), Ald. T. Hey (Chairman of the Electricity Committee), Ald. F. Watkinson (Chairman of the Housing Committee), Mr. W. Emmott, a pioneer of electrical engineering in Halifax, and Mr. G. A. Vowles, the borough electrical engineer and general manager. The exhibition, of a thoroughly representative character, included a completely furnished all-electric bungalow and a television theatre. Declaring the exhibition open, Sir Felix spoke of the vast service offered to the housewife and of the important and increasing part played by electricity in industry and in street lighting. There was a strong case for electrification of suburban railways and for trackless trolley buses. He particularly urged the desirability of trolley buses in towns where, like Halifax, there were steep gradients and heavy traffic. They were cheap to run in cost of power and completely mobile in the streets. Ald. Watkinson (Chairman of the Housing Committee) regretted that the present big development of electricity had not come sooner. It might have done much to alleviate the difficulties of farmers and the problems created by migration of people to the towns. Associated with Mr. Farrar in the promotion of the exhibition were Messrs. H. Birkhead, Hamer & Co., Ltd., Headon & Beanland, F. S. Jackson, A. Jewin & Co., Ltd., R. Maude and Thomas & Akroyd—all local registered electrical contractors. Stand-holders, in addition to the Corporation and M. F. Farrar & Co., were the Thermalux Electrical Products, Ltd.; the Hotpoint Electric Appliance Co., Ltd.; British National Electrics, Ltd.; Hailwood & Ackroyd, Ltd.; Jn. Mollett, Ltd.; of Halifax, Bradford and Leeds; Bulpitt & Sons, Ltd.; Burnley Electric Co., Ltd.; Geo. Bray & Co., Ltd.; L. G. Hawkins & Co., Ltd.; Belling & Co.; Revo Electric Co., Ltd.; British Thomson-Houston Co., Ltd.; Pohlmann & Son; A. Reyrolle & Co., Ltd.; Ferranti, Ltd.; Prentice, Ltd.; Laurence, Scott & Electromotors. The theatre was installed by Television Demonstrators (Blackpool), Ltd. The exhibition closes to-morrow (Saturday).

Two views of the Halifax Electrical Exhibition

Australian Tariff Decisions

The Commonwealth Dept. of Trade and Customs has decided to admit free of duty drums, heaters and other parts of steam boilers and a number of parts and materials used in the manufacture of radio valves. Details appear in the *Board of Trade Journal* of Sept. 13th.

Electrical Refrigeration in France

As a result of a symposium recently carried through by the French Société pour le Developpement des Applications de l'Electricité regarding the progress which is being made in connection with the adoption of electrical refrigerators in France based on replies received from 150 electricity distribution undertakings, it is shown that there were 14,080 refrigerators with a total load of 3,384 kW in use in French households at the end of September, 1933. There were also 118 large blocks of flats with a total of 1,157 refrigerators representing 177 kW. As regards commercial and industrial installations the return shows that there were in use throughout France 7,426 refrigerating chambers, 1,516 ice cream coolers, 3,984 cooling chambers, and 176 dairy and other similar installations representing a total of 18,770 kW. It is pointed out that the figures only represent the number of refrigerating units installed as reported to the electrical companies, which, however, have no trace of a large proportion of the number of small refrigerators privately installed in houses.

Works Visit

Members of the Manchester Association of Engineers recently visited the Trafford Park Works of the Metropolitan-Vickers Electrical Co., Ltd. They first inspected the automatic machine department. The large electrical machine test bed was next visited and the main electrical and mechanical aisles where both alternators and turbines of varying sizes up to 105,000 kW were seen in course of construction, including a 24,000-kW turbine for use under abnormal steam conditions as to pressure and temperature. After seeing the foundries, including the casting of M.-V. "C" aluminium alloy, the visitors went through some of the laboratories of the Research Department, finishing in the High Voltage Laboratory, where a high voltage impulse discharge was demonstrated. Before leaving the visitors took tea in the staff canteen, and Mr. Power, president of the Association, expressed their thanks to the company for their hospitality.

Coal Sampling

The report on the commercial grades of Lancashire coal published by the Department of Scientific and Industrial Research (Physical and Chemical Survey of the National Coal Resources No. 33, 1s. 6d.) contains a proximate analysis and analytical data of 103 grades from twenty-eight collieries. In his introduction Dr. F. S. Sinnett, Director of Fuel Research, describes his methods of sampling and analysis.

The French Electrical Industry

During last year the situation in the electrical construction industry in France has shown little tendency to improve. The manufacture of large machinery, which since 1930 has been steadily dropping, has reached a steady level at the lowest point of activity. Small electrical machinery, however, underwent a further fall of 5 per cent. for transformers and small generators and 7 per cent. for miscellaneous electrical apparatus. The only branch which has shown any activity is that for the manufacture of domestic electrical equipment, in which there has been a definite rise in production. While

there has been an important drop in export of material to foreign countries, the greater part of the decrease is due to reduced home consumption. The colonial market continues to absorb large quantities of electrical equipment, and many French manufacturers have decided to concentrate on this market. The competition in electrical machinery between French and foreign firms in the French market has led to the prolongation of the diplomatic agreements. Certain types of equipment, notably telephone equipment, cables, and certain insulating products, have been added to the list of articles subject to contingents. The results of the French policy of admitting as little foreign goods as possible has been felt in the last year by a severe fall in the imports of electrical equipment, especially radio equipment, imports of which fell by more than 31 per cent.

Lithuanian Import Restrictions

Further classes of goods have been added by the Lithuanian Government to the list of articles which may not be imported except under licence. They include dynamos, motors, transformers, coils, armatures, collectors and other parts of these machines, starting rheostats, regulators, &c., for motors and dynamos; wireless sets; and electric lamps.

Road Traffic Signals in India

The Department of Overseas Trade has issued a confidential report on the market for road traffic signalling apparatus in India.

Irish Free State Electrical Imports

The imports of electrical machinery and cognate material into the Irish Free State during July last showed a notable increase, having attained a value of £68,632 as compared with £42,184 in the corresponding month a year ago. The appended table shows the imports during the first seven months of the current and past years; as will be seen, there is an increase in the aggregate of £6,775 despite the greatly reduced imports of radio material.

	January–July. 1933.	1934.
	£	£
Electrical machinery	130,445	163,713
Electric wires and cables	37,621	52,861
Electric lighting accessories, fittings and parts	22,695	24,589
Radio sets and parts	107,836	61,273
Other electrical goods	120,720	123,656
Total	£419,317	£426,092

Persian Import Quota

The Persian authorities have fixed quotas for imports of a number of classes of goods for the economic year ending June, 1935. These include electrical materials for which a value of 16.5 million rials has been fixed.

Radio Components Standardisation

A serious endeavour is being made by the Radio Component Manufacturers' Federation to standardise as many components as possible, to ensure uniformity and avoid the risk of imperfect parts entering into the manufacture of commercial radio apparatus. During the past eighteen months fifteen standardisation groups have been formed under various convenors. Each group deals with a different class of component and the forty-two members of the Federation are invited to select the groups to which they wish to belong, the present average membership being ten firms per group.

Group recommendations are considered by the Standardisation Committee, which consists of the convenors of all the groups; points agreed are circulated as proposals to all members, whose comments thereon are referred back to the groups concerned. After final agreement and ratification by the Federation Council, the proposals are published. All decisions are divided into "recommended practices" and definite R.C.M.F. standards.

The first list of proposals was issued to members in September, 1933, and standardisation reports were published in December, 1933, and August, 1934. The latter includes all previous reports and is a complete record of the excellent results obtained to date. Copies, in loose-leaf form with binding cover, are available at 5s. each from the Radio Component Manufacturers' Federation, 83, Cannon Street, London, E.C.4.

The Electrical Industry in the Midlands

Improvement in the home market is to be noted in several branches of the electrical manufacturing industry in the Midlands. Birmingham manufacturers of accessories are doing better, and some good orders have been received for medium-sized switchgear. There is, too, evidence of seasonal activity in factories for the production of domestic heaters and fires. Makers of cables at Derby also report an upward business trend.

Australian Electrical Imports

In Australia's import trade in electrical machinery and appliances some noteworthy increases were shown in the twelve months ended June last, as compared with the corresponding period of 1933. Imports of covered cable and wire were £454,215 in value as against £376,324, dynamo-electric machines £220,482 (£91,718), filament lamps £134,510 (£103,661), and telegraph and telephone material £121,576 (£50,780). Batteries and accumulators were imported to the value of £20,201 as compared with £18,947, and other electrical machinery and appliances (unspecified) to the value of £684,483 as against £780,958 during 1932-33. The grand total stood at £1,635,467 compared with £1,422,388. But while these figures show some recovery it must not be forgotten that they are far below their former level. For example, in 1930-31 Australia's total imports of electrical machinery and appliances were valued at £2,841,930, and in the years 1927 to 1930 those of covered cable and wire alone averaged £1,519,000 in value.

The Mazda Girl in a Carnival

At the recent Gravesend Chamber of Trade Carnival which marked the opening of the Gravesend Prosperity Week, the Gravesend branch of the Electrical Contractors' Association entered a well-arranged tableau. As our picture shows, the centre of attraction was a young lady impersonating the "Mazda" girl, with the familiar slogan "Beauty Enriched by Light."

The "Mazda" girl at Gravesend

Change of Address

The following National and District organisations have been transferred to 1, Dickinson Street West, Manchester, 2: The National Joint Industrial Council for the Electricity Supply Industry, the National Joint Board of Employers and Members of Staff (Electricity Supply Industry), District Council (No. 3) North Western Area Electricity Supply Industry, District Joint Board of Employers and Staff Members (Electricity Supply Industry), North Western (No. 3) Area.

American Domestic Appliances Exports

So far this year there has been a distinct improvement in the overseas demand for American domestic electrical appliances. The appended table shows the exports of such goods from the United States during the six months ended with June last as compared with the corresponding half of 1933, from which it will be seen there was an increase of £453,246, or about 110 per cent.

	January–June. 1933.		1934.	
	No.	Value £.	No.	Value £.
Fans	13,237	17,666	45,340	45,333
Household refrigerators ...	22,278	317,708	44,971	718,661
Washing machines	1,440	12,866	2,320	24,366
Irons	34,737	6,902	29,696	9,582
Cooking ranges	735	11,336	1,177	17,653
Vacuum cleaners	18,241	28,581	6,300	22,821
Other domestic electrical appliances	45,427	16,028	51,140	25,917
Totals		£411,087		£864,333

Points in the table to which attention may be drawn are the marked increase in the exports of domestic refrigerators and the falling off in vacuum cleaners.

New Electricity Showrooms

The new electricity showrooms of Bury St. Edmund's Town Council are to be opened on October 8th.

Deferred Payment

At the opening meeting of the British Sales Promotion Association at 6.30 p.m. on Wednesday, October 3rd, at the Hotel Reubens, Buckingham Palace Road, S.W.1, Mr. J. Gibson Jarvie will give an address on "Deferred Terms as a Sales Stimulant."

The Electrical Situation in French Morocco

Reports on the economic conditions in Morocco covering the French, Spanish and Tangier zones have been supplied to the Department of Overseas Trade (Stationery Office 2s. 3d. net), but only that relating to the French zone contains information of electrical interest. Trading conditions in this zone have been better than in many countries during October, 1932, to September, 1933, the period covered by the report, although the statistics available of imports are only to the end of 1932. These show that the value of electrical machines and dynamos imported in 1932 was 2,322,000 fr. (against 8,766,000 fr. in 1931), the United Kingdom's share totalling only 4,000 fr. Wireless sets imported totalled 3,972,000 fr. (against 4,019,000 fr. in 1931), the United Kingdom supplying sets to the value of 30,000 fr. Imports of electrical apparatus, &c., were valued at 32,668,000 fr. (11,089,000 fr. in 1931), of which the United Kingdom accounted for 34,000 fr. Virtually the whole of the development of electric power in the French zone of Morocco is in the hands of the Energie Electrique du Maroc. During the past eight years the production of electric power has in-

creased from ten million kWh in 1925 to close on one hundred million in 1932. In the first quarter of 1933, 26.5 million kWh were furnished as against 22.5 million in the previous year. The company has two important plants in operation, a thermo-electric one at Casablanca and one at Si Said Machou on the Oumm el Rebia. A network of h.p. cables totalling nearly 1,000 km. connects these two stations and distributes power to the electric railways (Casablanca-Rabat-Port Lyautey, and Casablanca-Marrakesh with branch line to Kouright), to the phosphate mines at Kourigha and to the towns of Casablanca, Rabat-Salé, Port Lyautey, Meknes, Fez and Marrakesh. A further hydro-electric station should be completed before the end of 1934 at El Kansera, where there is a large barrage on the Oued Beth.

Social Event

The autumn meeting of the Institute of the Plastics Industry Golfing Society will be held at Hadley Wood Golf Club on October 12th. The competition at this meeting will be for the trophy presented by Mr. W. C. Waghorne, chairman of the British Plastics Federation.

"Drydex" Batteries

The Chloride Electrical Storage Co., Ltd., has reduced the price of its "Drydex" pen torch, type 2PT5, and announces the introduction of a number of new "Drydex" radio batteries.

Recent Contracts

The Hart Accumulator Co., Ltd., has received an order from the Post Office for 25,750 sets of plates, to be used principally as replacements for batteries installed in the smaller telephone exchanges.

The L.M. Ericsson Telephone Co., Sweden, has contracted with the town and port of Ningpo to build and instal a new telephone exchange in that city. The contract includes instruments and cables for about 2,500 lines.

The Alton Battery Co., Ltd., reports that contracts in hand include batteries for the Glenlee and Tongland power stations of the Galloway Water Power Co.; a 120-cell battery for Ballinlough electricity works, Ireland; a 120-cell 450-Ah battery for Slangkop wireless station, South Africa, and five batteries for the South African Posts and Telegraphs Department.

Low Temperature Warming

A booklet prepared by the staff of the City of London Electric Lighting Co., Ltd., should be useful to all interested in the case for warming rooms by electric heaters with comparatively large emission surfaces with a temperature that does not exceed 200 deg. F. The arguments for the method are well chosen, and particulars are given of different types of apparatus. The company charges ½d. per kWh for low-temperature warming between 7 p.m. and 10 a.m. and ¾d. at other times (without fixed charge), compared with 7s. 6d. per quarter per kW connected and ¾d. per kWh for luminous electric fires. The publication also includes some notes on electric lighting that should be equally useful in that sphere.

Novel Shop Lighting

A good example of enterprise in lighting is furnished by Messrs. Thornton & Stimpson's stores in the Market Place, Kingston-upon-Thames, where an improved installation has recently been put into operation. In the main entrance is a 20-in. fitting (G.E.C.), the metalwork of which is designed to represent the Coronation Stone at Kingston, and the glazing is of snuffled and obscured amber glass. The ground floor

The flowers in this stores' department are seen in their natural colours by means of the special lighting installation

window lighting utilises a system of trough reflectors, while on the first floor the lighting is accomplished by "Gecoray" reflectors fitted with colour screens. A novelty is the continuous cycle of colour changes. The ground floor showrooms are illuminated by units incorporating four 60-W "Osram" architectural lamps arranged to form a circle of light. In the centre of each circle is a spherical globe containing a 200-W lamp. A feature of the mounting of this central fixture is that the gallery and points of attachment are concealed from view, so that a light source of peculiarly pleasing outline is provided. The first floor consists of two showrooms, one of which is arranged in the form of a conservatory. Here dispersive reflectors are employed, the main lighting being by standard "Osram" lamps. "Daylight" colour-correcting screens reveal the true colours of the flowers. The installation was carried out by the Borough Electricity Department.

Trade Announcements

Val Walker, Ltd., electrical engineers, 133, Week Street, Maidstone, have opened a branch business at High Street, Aylesford.

Messrs. George Ellison, Ltd., are opening a new sales office for Scotland at 200, St. Vincent Street, Glasgow, C.2, on October 1st. A showroom has been fitted out to display the latest Ellison drawout distribution switchgear, and specimen parts made from Tufnol, sheet, tube and rod.

Messrs. Simpson, Baker & Co., Ltd., are opening a depôt at 39, Church Street, Birmingham, on October 1st (telephone: Central 1335).

Extensions at Electrical Domestic School

Extensions at the London School of Electrical Domestic Science were opened on September 24th. Although it is less than eight months since the School was inaugurated, additional space soon became necessary. The new section is in another part of Imperial Court, Knightsbridge, and has been furnished as a laundry. In this way, additional space is made available in the kitchen. As one of the first results of this expansion, it has been possible to include a series of evening classes in the autumn session. Among those who are conducting the classes are Miss H. M. M. Minoprio (Principal), Miss E. Robinson (British Electrical Development Association), Miss Howard Hall (Central School of Speech Training and Dramatic Art), and Mr. F. T. Hewson (Westminster Electric Supply Corporation). An intensive holiday course held for one week in August, specially for women demonstrators, was a success and is to be repeated.

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances:—

CHEMICALS, ETC.	Price. September 26th.	Fortnight's Inc. or Dec.
a Acid, Oxalic ... ... per cwt.	50s.	—
a Ammoniac, Sal ... ... per ton	£40	—
a Ammonia, Muriate (large crystal) ... ,,	£38	—
a Borax ... ... ,,	£17	—
a Copper, Sulphate ... ... ,,	£19 15s.	—
a Potash, Chlorate ... ... per lb.	3½d. to 4¼d.	—
a ,, Perchlorate ... ... ,,	6d.	—
a Shellac T.N. ... ... per cwt.	£4 18s.	—
a Sulphur Commercial... ... ... per ton	£11	—
a ,, Roll ... ... ,,	£11	—
a Soda Chlorate ... ... per lb.	3½d. to 3¾d.	—
a ,, Crystals... ... ... per ton	£5 to £5 5s.	—
a Sodium Bichromate, casks ... ... per lb.	4d. nett.	—
METALS, ETC.		
b Aluminium, Ingots ... ... per ton	£100 to £105	—
b ,, Wire ... ... per lb.	1/1 to 1/9	—
b ,, Sheet and Foil... ... ... ,,	1/2 to 2/9	—
p Babbits Metal and Anti-friction Metals—		
Grade I ... ... per ton net	£206	£1 inc.
Grade II ... ... ,,	£141	£1 inc.
Grade III ... ... ,,	£67	—
c Brass (rolled metal 2" to 12" basis)... per lb.	9¼d.	—
c ,, Tubes (solid drawn) ... ... ,,	8¼d. to 9d.	—
c ,, Wire, basis ... ... ,,	7¼d.	—
c Copper Tubes (solid drawn)... ... ,,	9¼d.	—
g ,, Bars (best selected)... ... per ton	£58	—
g ,, Sheet... ... ... ,,		
g ,, Rod ... ... ,,		
d ,, (Electrolytic) Bars ... ... ,,	£31	—
g ,, ,, Sheets ... ,,	£30 10s. to £30 15s.	—
d ,, ,, Wire Rods ... ,,	£36 10s.	—
d ,, ,, H.C. Wire ... per lb.	6¼d.	—
f Ebonite Rod ... ... ,,	1/3 to 1/6 plus 10%	—
f ,, Sheet ... ... ,,		
n German Silver Wire... ... ... ,,	2/5	—
h Gutta-percha, fine ... ... ,,	nom.	—
h India-rubber, Para fine ... ... ,,	5¼d.	¼d. inc.
i Iron, Pig (Cleveland No. 3) ... per ton	62/6	—
i ,, Wire galv. No. 1, P.O. qual. ... ,,	£20	—
g Lead, English Pig ... ... ,,	£12 10s.	5s. inc.
g Mercury ... ... per bot.	£11/10/0 to £11/12/6	—
c Mica (in original cases) small ... per lb.	6d. to 3/6	—
e ,, ,, medium ... ,,	4/- to 8/-	—
e ,, ,, large ... ,,	8/6 to 17/6 & up	—
p Phosphor Bronze, plain castings ... ,,	1/1	—
p ,, ,, drawn bars & rods ,,	10¾d.	—
p ,, ,, rolled strip & Sheet ,,	10¼d.	—
p ,, ,, wire ... ... ,,	11¼d.	—
o Platinum ... ... per oz.	£7 15s.	—
d Silicium Bronze Wire ... ... per lb.	7¾d.	—
r Steel, magnet, in bars ... ... ,,	7¼d.	—
g Tin, Block (English) ... ... per ton	£232 10s. to £234 10s.	£4 5s. inc.
n ,, Wire, Nos. 1 to 16 ... ... per lb.	3/8	—

Quotations supplied by:—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Gutta Percha and Telegraph Works Co., Ltd.
g James & Shakespeare.
h Edward Till & Co.
i Bolling & Lowe.
l Richard Johnson & Nephew, Ltd.
n P. Ormiston & Sons.
o Johnson Matthey & Co.
p C. Clifford & Sons, Ltd.
r W. F. Dennis & Co.

The above table is published here fortnightly. In alternate issues, in which it does not appear, the latest prices of copper, silicium bronze wire, lead and rubber, up to the time of going to press, are given in our "Business Notes" under the same heading.

New Catalogues and Lists

Jackson & Kenrick, Ltd., The Hayes, Lye, near Stourbridge.—Price list No. 113 of "Athro" steel conduit.

British Insulated Cables, Ltd., Prescot, Lancs.—Leaflet P.F.47 describing B.I. ironclad service cut-outs and connections for meters. A catalogue on wiring and cables for ships.

Berry's Electric, Ltd., 85-86, Newman Street, Oxford Street, London.—A showcard entitled "Switch on Firelight Happiness," depicting an attractive maiden warming herself in the glow of a "Magicoal" fire.

Drake & Gorham Wholesale, Ltd., 77, Long Acre, London, W.C.2.—Catalogues for 1935 of electric clocks and lighting fittings.

Edward Allen & Sons, Electric Works, St. John's Road, Summerhill, Tipton.—A catalogue of domestic appliances.

Arora Co., Loughborough.—A catalogue of the company's products.

Jackson Electric Stove Co., Ltd., 143, Sloane Street, London, S.W.1.—A catalogue of the new season's electric fires.

Philips Lamps, Ltd., 145, Charing Cross Road, London, W.C.2.—Leaflets on the coiled-coil filament lamp.

Hopkinsons, Ltd., Britannia Works, Huddersfield.—Catalogue of electrically operated engine-room telegraphs.

R. A. Beard, Ltd., 10, Trafalgar Road, Old Kent Road, London, S.E.15.—Leaflets on the new magazine projector and outdoor floodlights.

Watson & Sons (Electro-Medical), Ltd., 43-47, Parker Street, Kingsway, London.—A booklet on short-wave therapy.

Better Lines Co., Mile Oak, Tamworth, Staffs.—Photographic illustrations and details of unit sub-stations.

General Electric Co., Ltd., Magnet House, Kingsway, London.—Catalogues of electric fires and household appliances and furnaces.

Premier Electric Heaters, Ltd., Keeley Street and St. Andrew Road, Birmingham.—A new coffee percolator showcard.

London Electric Wire Company & Smiths, Ltd., Church Road, Leyton, E.10.—A wire tables booklet.

British Thomson-Houston Co., Ltd., Rugby—Catalogues of "Mazda" lamps.

The Marconiphone Co., Ltd., 210/212, Tottenham Court Road, London, W.1.—Specifications of 1934/5 models.

Cambridge Instrument Co., Ltd., 45, Grosvenor Place, London, S.W.1.—A brochure on the direct reading pH meter.

M.C.L. & Repetition, Ltd., Pool Lane, Langley, Birmingham.—A booklet on products turned from the bar in brass, steel, &c., introducing "Serg. Twist," "General Precision," "Major Quality," and others.

National Lighting Co., Ltd., 19, St. Bride Street, London, E.C.4.—A general photogravure catalogue of lighting fittings and domestic appliances.

W. T. Henley's Telegraph Works & Maintenance Co., Ltd., Holborn Viaduct, London.—A profusely illustrated booklet entitled "Electricity and the Churches."

Bankruptcy Proceedings

C. E. Keates, electrical and mechanical engineer, 110, Brent Road, Hendon.—The debtor has also dealt in wireless goods, and on Thursday the adjourned statutory first meeting of his creditors was held in Bankruptcy Buildings, Carey Street, W.C., Mr. S. W. Hood, Official Receiver, presiding. The ranking liabilities are estimated at £3,095 and the assets are valued at £1,110. The debtor attributes his insolvency to bad trade, heavy overhead expenses, illness over long periods during the past four years and depreciation of wireless stock. The meeting passed a resolution for the appointment of Mr. W. A. J. Osborne, Balfour House, Finsbury Pavement, E.C., as trustee of the debtor's estate and recommended his fidelity bond at £1,000.

F. H. Pountney, trading as Bordesley Electrical Co., 164, High Street, Bordesley, Birmingham, electrical engineer.—A deficiency of £2,747 was disclosed at the first meeting of creditors of the above held on September 17th at the Official Receiver's office, 159, Great Charles Street, Birmingham. Debtor said his failure was due to assuming liabilities of £1,600 on behalf of a limited company, selling wireless accessories at an insufficient margin of profit, depreciation in the value of stock, and slump in trade since 1931. The creditors appointed Mr. F. E. Bendall as trustee of the estate, with a committee of inspection.

F. F. C. Evett, 28, Flottergate, Great Grimsby, trading as "Radiofans Service," formerly 3, Lindsey Road, Cleethorpes, wireless and electrical contractor.—The receiving order herein was made on the debtor's own petition, and at the first meeting of creditors held recently at the Official Receiver's office, St. Mary's Chambers, Great Grimsby, it was stated that the ranking liabilities were £790 and the assets were estimated to realise £100, leaving a deficiency of £690. The case, being a summary one, was left in the hands of the Official Receiver as trustee.

A. W. Tack (Ensbury Electrical Supplies), electrical and radio retailer, 119, Columbia Road, Bournemouth.—Receiving order made September 17th on debtor's own petition. First meeting October 2nd at 10, Rockstone Place, Southampton. Public examination October 25th at the Law Courts, Bournemouth.

J. D. Dickinson, wireless and electrical dealer, 671, Chesterfield Road, Sheffield.—Public examination October 11th at the County Court Hall, Sheffield.

Company Liquidations

Electrical & Radio Products (1931), Ltd., Horley, Surrey.—The accounts submitted under the compulsory liquidation of this company show total liabilities of £59,086 (ranking £25,010), assets £13,117 (absorbed in preferential and debenture claims), and a deficiency of £39,506 with regard to contributories, the issued capital being returned at £14,496. Mr. J. Barwick Thompson, Official Receiver, reports that the company was formed in August, 1931, to acquire the undertaking of Electrical & Radio Products, Ltd., and to manufacture and sell wireless apparatus, &c., both wholesale and retail. According to the statements of Mr. Joseph Leonard Gottlieb, the managing director, the company when formed manufactured a large quantity of wireless receiving sets and obtained a stand at the Wireless Trade Exhibition held in or about September, 1931. The company transacted little business at the Exhibition as according to Gottlieb the manufacturers of wireless apparatus and the principal wholesale dealers had formed an association by which the members undertook to trade among themselves and as the company was not a member of the Association they automatically became excluded from a large part of the wholesale market. As a result of the failure to obtain any substantial orders from the Wireless Exhibition the instruments manufactured had to be sold through other channels, and the company thereby incurred heavy losses. In 1932 the directors endeavoured to create a selling organisation, but the efforts were unsuccessful as they were unable to grant extended credit to the dealers and also were unable to finance hire-purchase transactions. During the 1933 season the company adopted a new policy and dealt with retail shops only on a ready cash basis. The failure of the company is attributed by Gottlieb to lack of working capital, difficulty in obtaining credit, long illness of the managing director, and the reduction of prices by the large manufacturers in February, 1934. In the opinion of the Official Receiver the company's failure is directly attributable to mismanagement on the part of the directors in that the company never had any real working capital placed at its disposal. The liquidation remains in the hands of the Official Receiver.

Forum & Co., Ltd.—Winding up voluntarily. Liquidator, Mr. W. F. Chaundry, 71, Temple Row, Birmingham.

Agra Engineering Co., Ltd.—Winding up voluntarily for reconstruction purposes. Liquidator, Mr. V. R. Symons, Bridge Buildings, Barnstaple.

A. W. H. Sound Reproducing Co., Ltd.—Particulars of claims by October 19th to the liquidator, Mr. C. Latham, 78, New Oxford Street, W.C.

Worcester Electric Traction Co., Ltd.—Winding up voluntarily. Liquidators, Messrs. C. H. Dade and T. N. Underhill, 88, Kingsway, W.C.

Chas. Bingham & Co., Ltd.—Winding up voluntarily.

Private Arrangements

The Times Electric Co., Ltd., 146a, Queen Victoria Street, London, E.C.4, factors of electrical accessories.—In response to a circular letter issued by Messrs. Robert J. Ward & Co., C.A., 10, Serjeants' Inn, E.C.4, a meeting of the creditors in this matter was held on September 13th at Anderton's Hotel, Fleet Street, E.C.4, when the representative of the Agro Electrical Co., the principal trade creditors, presided. Mr. S. Enever said that the liabilities amounted to £3,733, of which £1,563 was due to the trade, and Mr. C. Hook, the managing director of the company, was a cash creditor for £2,170. The total assets were £1,758, or a deficiency of £1,975. The company was incorporated on May 14th, 1913, to take over as from June, 1913, a business which had been previously carried on by Mr. Hook and a Mr. Pointer. The nominal capital was £3,000, of which £1,000 was subscribed for in cash. The business had been carried on successfully and from time to time dividends were paid, the last dividend being declared in 1925. It was decided at a directors' meeting that the dividends which should have been paid to Mr. Hook should be treated as a loan to the company bearing interest at the rate of six per cent. per annum. According to a balance sheet which was prepared in 1923, there was a surplus of assets over liabilities of £1,545. In 1927 the sales were £14,087; by 1930 they had dropped to £11,795, and there was a net loss in that year of £444. In 1933 the turnover had fallen to a figure of £8,080, and the net loss was £798, while for the year to May, 1934, the sales were £7,355, the gross profit was £1,792, and there was a net loss of £706. The managing director attributed the decline in turnover to increased competition from cut price traders and to lack of working capital. Negotiations had been on foot for some time for the introduction of further working capital, and it was not until a short while ago that those negotiations fell through. It was then decided to call the creditors together to discuss the present financial position. Mr. Hook was desirous of carrying on the business, having regard to the fact that the company had traded successfully for many years. Mr. Enever said that he was instructed by the company to suggest that a moratorium should be granted for twelve months, and that the creditors should be paid a dividend over that period of 12s. 6d. in the £ by equal instalments at four, eight, and twelve months. No security, however, could be given. If the creditors accepted the moratorium, Mr. Hook would postpone his claim as a cash creditor until the trade creditors had received their composition. It was resolved to appoint Messrs. Butler, Viney & Co., C.A., Coleman Street, E.C., to investigate the matter further, and report to the creditors at a meeting to be held seven days later.

A. J. Rowberry, trading as W. Rowberry, 131, St. Owen Street, Hereford, electrical engineer.—A meeting of the creditors herein was held recently when a statement of affairs, which had been prepared by Messrs. Poppleton & Appleby, of Birmingham, was submitted which showed liabilities of £2,594, of which £2,260 was due to the trade, and there were loan creditors for £334. In addition, there were fully secured creditors for £2,520. The assets were estimated to produce £2,279 from which had to be deducted £5 for preferential claims, leaving net assets of £2,274, or a deficiency of £319 14s. 11d. It was stated that the debtor took over the business when his father died in 1908. His capital was £100. He agreed to purchase the stock for the sum of £650, which was paid for at the rate of £50 per annum. For the year to December 31st, 1930, the turnover was £7,102, and there was a net loss of £486. In the following year there was a loss of £233, the turnover being £7,395, but for the year to December 31st, 1932, there was a profit of £142, although the turnover had dropped to £6,905. From December, 1932, to December, 1933, the turnover was £7,349, and there was a net loss of £570. It was resolved that the estate should be dealt with under a deed of assignment in favour of Mr. F. E. Bendall, of Messrs. Poppleton & Appleby, as trustee. A committee of inspection was also appointed consisting of the representatives of Callender's Cable & Construction Co., Ltd., General Electric Co., Ltd., Simpson, Baker & Co., Baxendale & Co., and Mr. A. Cripwell.

Electricity Supply

Lighting, Domestic, Power

Ab Kettleby.—CANVASS.—At a recent meeting of the parishioners of Ab Kettleby, Holwell, Wartnaby and Welby it was decided to hold a canvass with a view to obtaining electricity supplies for the villages.

Airdrie.—NEGOTIATIONS WITH THE CLYDE VALLEY CO.—At a special meeting of the Council the draft agreement with the Clyde Valley Co. was approved, subject to the adjustment of five outstanding points which were not divulged. The adjoining burgh of Coatbridge appointed a sub-committee to meet representatives of the Clyde Valley Co. to elucidate the position of Coatbridge Town Council in the event of negotiations being completed for the taking over by the Company of the whole undertaking in Coatbridge and Airdrie.

Australia.—EXTENSIONS.—The Victoria Electricity Commission is extending its supply to Upper Beaconsfield and Inverloch, where for the last three years a private electric lighting plant has been supplying a few consumers and street lamps.

Barnsley.—LOAN SANCTIONED.—The Town Council has received sanction to a loan of £3,100 for distribution mains at Ardsley and Highstone Lane.

Bexhill.—LOAN.—The Electricity Committee has obtained sanction to borrow £2,000 for mains and plant in connection with the change-over in the Cranston Avenue area.

Blackpool.—PROGRESS.—The Electricity Department has found it necessary to provide six new transformers in various districts on the outskirts of the town. During the last five months 1,509 new consumers have been secured, an increase of 104 on the number during the corresponding period of last year.

Brighton.—NEW FIXED CHARGES.—The Electricity Committee has approved the following new fixed annual charges for combined lighting, heating, cooking and general domestic purposes, divided into four equal quarterly payments, plus an additional charge of ¼d. per kWh: For any area up to 500 sq. ft., £1 10s.; each additional 100 sq. ft. or part up to 2,000 sq. ft., at 6s.; up to 5,000 sq. ft., 3s.; in excess of 5,000 sq. ft., 2s. These rates apply to certain premises up to a rateable value of £80 per annum, and include meter rentals. New hire charges for cookers and water heaters have also been arranged.

MAINS EXTENSIONS.—The mains are to be extended a distance of 6,726 yds. at a cost of £4,876.

SUB-STATION.—In order to provide a block of flats being built in Western Street with electricity, it is intended to erect a sub-station at a cost of £2,920.

ALL-ELECTRIC HOUSES.—Following the decision of the Corporation to build thirty-one small houses, the General Purposes Committee has decided to make them all-electric with the exception of one coal grate in each living room.

The suspension bridge at Conway, which provides an excellent subject for flood-lighting

Bury St. Edmund's.—SPECIAL TARIFF.—The Town Council has decided to supply electricity to hotels and churches on the business tariff at ¾d. per kWh, subject to control by time switch for a certain peak period.

Canada.—GENERATION DURING JULY.—Canadian central electric stations generated in July 1,621,314 million kWh, or a daily average of 52,300 million kWh, a decrease of 4,654 million kWh as compared with the June daily output. The index number dropped from 179.47 to 164.76, the lowest since January. The decrease was largely in the exports total, which dropped from 113,640 million kWh in June to 105,848 million kWh in July, as well as in deliveries to electric boilers, which declined from 418,850 million kWh to 342,658 million kWh during the month.

DOMESTIC ELECTRICITY.—The Dominion Bureau of Statistics at Ottawa has just issued its annual report on "Index Numbers of Rates for Electricity for Residence Lighting and Tables of Monthly Bills for Domestic Service, Commercial and Small Power." This volume shows that the revenue from domestic electric light sales index figure for 1933 was 88.96, based on the 1926 average as 100. The index numbers for 1931 and 1932 were respectively 88.75 and 88.65.

Chard (Som).—NO OPTION.—The Borough Council has decided not to reconsider its decision to allow only gas to be used for the lighting and heating of Council houses at Bonfire Close, Chard. The Somerset & District Electricity Supply Co. asked the Council to remove the ban so that tenants who desired to have electric current laid on could do so.

Chirk.—STREET LIGHTING.—The new electric street lighting was switched on in the village of Black Park on September 15th.

Clitheroe.—ASSISTED-WIRING SCHEME.—The Electricity Committee is to wire houses and shops at a payment of 1d. per "point" per week until capital cost is met.

REDUCED CHARGES.—The charge for current supplied to consumers for tubular heating has been amended as follows: First 1,000 kWh at 1d. per kWh; next 2,000 at ¾d.; all over 3,000 at ½d. A special electricity tariff for hotel lighting and other purposes has been approved.

SUPPLY TO DOWNHAM.—The Corporation is providing a supply of electricity to Downham.

Corby.—ELECTRICAL DEVELOPMENT.—A temporary office and showroom are to be erected in Bessemer Grove, Corby, by Kettering Electricity Department, and a sub-station is to be erected near Rockingham Road.

Clydebank.—LOANS.—The Council has resolved to borrow for public lighting by electricity: Tower wagon and garage (£700) and lighting of Parkhall, Mount Blow, McDonald's Brae, West Thomson Street to Janette Street, Parkhall Road to Napier Street (£2,300).

Dunfermline.—QUESTION OF CHARGES.—The Dunfermline Town Council has decided to seek a conference with the Fife Electric Power Co. to urge that the basic charge of 6d. per kWh for lighting, which has been in operation for ten years, should be reduced.

France.—SUB-STATION EQUIPMENT.—Among the outdoor sub-station equipment recently completed by the Alsthom Co., of Paris, are two sets of three 25,000-kVA 220/60/11-kV monophase transformers for the Chevilly station of the Paris-Orleans Railway Co. and two 40,000-kVA 8.8/150/220-kV three-phase transformers for the Kembs hydro-electric plant on the Rhine.

GENERATION.—According to the *Revue Générale de l'Electricité*, the output of the sixty-nine principal electric power stations in France during the first half of this year (representing about 93.5 per cent. of the total generation), was 5,249 million kWh, compared with 4,965 million kWh in the corresponding period of 1933, an increase of 5.52 per cent. Of the total, 3,271 million kWh is credited to hydro-electric plants.

Glasgow.—ELECTRICITY FROM REFUSE.—The production of electrical energy from refuse is proving a valuable source of revenue for the Cleansing Department. The Electricity Department paid £24,841 to the Cleansing Department for electrical energy produced at the Govan refuse power works for the year ended May 31st.

Grays (Essex).—BULK SUPPLY TERMS.—The Urban District Council has arranged amended terms for a bulk supply with the County of London Electric Supply Co., Ltd., namely: Maximum demand charge, £3 5s. per kWh per annum; "unit" charge, 0.26d. per kWh; service charge, £1,200 per annum, with a coal clause variation of 0.0075d. per kWh increase or decrease for every 6d. per ton rise or fall in the price of coal above or below the basic price of 15s. per ton.

Hook Norton.—STREET LIGHTING.—An agreement has been reached with the electricity supply company, and it is hoped that the new electric street lighting will be in operation by October 7th.

Italy.—INCREASE IN GENERATION DURING 1933.—Details of the 1933 report on the progress of electricity supply in Italy are given in *L'Energia Elettrica*. The return is based on reports from 1,695 private electricity supply undertakings and sixty-five concerns partly private and partly municipal.

The aggregate output of the hydro-electric stations amounted to 10,724 million kWh, as compared with 9,721 million kWh in 1932, an increase of about 10.3 per cent. In addition, a certain amount of hydro-electric power was imported from Switzerland, bringing the available total to 10,900 million kWh, as against 9,890 million kWh. There was also an increase in the output of power at the steam and internal-combustion-engined stations from 292 million to 338 million kWh, and an advance in the total production and importation from 10,182 million to 11,239 million kWh, or just over 10 per cent.

A feature of the year was the continued amalgamation of power supply undertakings. The largest group is the Edison with a total capital of 3,690 million lire.

Kettering.—NEW SUPPLY.—Harrington and Stanion are to have an electricity supply from Kettering. The capital outlay in taking the supply will be £568 and £1,160 respectively, and application is to be made to the Electricity Commissioners to borrow £1,728 for the purpose.

STREET LIGHTING.—The Revo Electric Co., Ltd., is to provide and erect centrally suspended lighting in certain streets at Kettering (£2,419). Boddington Road, Masefield Road, Netherfield Road, Shelley Road and Wordsworth Road are to be electrically lighted.

London.—STOKE NEWINGTON.—The Electricity Committee is seeking sanction to borrow £5,000 for mains and services and £5,000 for domestic apparatus for hire.

Market Rasen.—SUPPLY INAUGURATED.—The supply of electricity from the North Lincolnshire & Howdenshire Electricity Co. was inaugurated on September 13th.

Mildenhall.—EXTENSIONS.—The East Anglian Electricity Supply Co., Ltd., has sought the consent of the Rural District Council to the erection of overhead lines at Hightown, Mildenhall, Barton Mills, Worlington, and Eriswell. The Council desires the mains at Mildenhall to be placed underground.

Motherwell and Wishaw.—LOAN.—The Town Council has applied for a loan of £7,000 for meters.

Nairn.—STREET LIGHTING.—The Town Council is to borrow £1,250 to defray the cost of the introduction of electricity for street-lighting purposes.

North Kilworth.—COUNCIL'S APPROVAL.—Leicestershire and Warwickshire Electric Power Co.'s proposal to erect an overhead line to North Kilworth has been approved by Lutterworth Rural District Council.

Norwich.—CHEAPER ELECTRICITY.—Following the successful operation of the Corporation electricity undertaking last year, the Electricity Committee is to make the following reductions in electricity charges, involving a concession of £10,000 to consumers: "Unit" charge of domestic tariff, from ¾d. to ½d.; Council house charges, 126 kWh not charged for instead of 106 kWh in the winter, 50 kWh instead of 40 kWh in the summer, energy in excess of these amounts being charged at ½d. instead of ¾d. Cooker rentals are also to be reduced.

Puddletrenthide.—INAUGURATION OF SUPPLY.—The electricity supply from the grid was put into operation in the village last week.

Ripon.—DISPOSAL OF ELECTRICITY WORKS.—The City Council is considering a proposal that Harrogate should take over the electricity undertaking at its book value.

Rothbury (Northumberland).—A CHANGE.—From October 1st the streets are to be lighted by electricity instead of gas.

Rugeley.—SUPPLY TO SEWAGE WORKS.—The Urban District Council is to reopen negotiations with the Trent Valley & High Peak Electricity Co., Ltd., with a view to the company's extending its supply to the sewage works.

Salford.—CONSUMERS.—During 1933-34 the number of consumers supplied by the Electricity Department increased by 5,267 to 27,899, the additional number being larger than in any other year.

Sheffield.—DEVELOPMENT.—The 1933-34 report of the Electricity Department states that mains were extended during the period by 66 miles, bringing the total to nearly 2,000.

Shipley.—LOAN SANCTIONED.—The Electricity Committee has received sanction to borrow £3,742 for mains and plant.

Singapore.—TEN PER CENT. INCREASE.—Nearly a million additional kWh was sold by the Electricity Department in 1933, compared with 1932, an increase of 10.48 per cent. During the year 1,238 new consumers were obtained, the figure for 1932 being 989. The trading profit was $452,921.

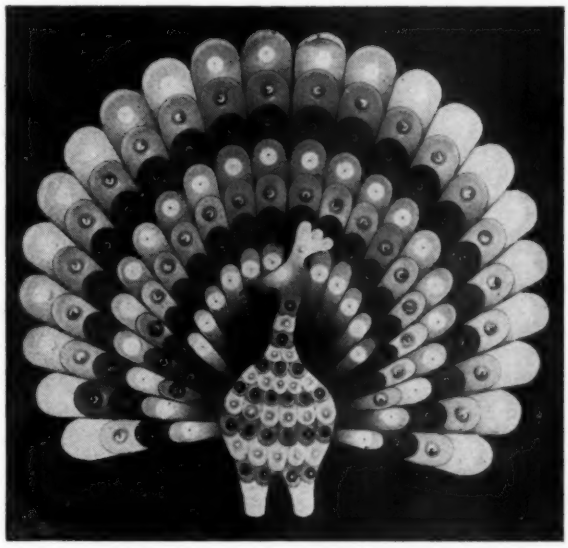
South Africa.—NEW SCHEMES.—Springs (Transvaal) Town Council is considering extensions to the municipal electricity supply system at a cost of £4,580, including two additional sub-stations. At Prieska, Cape Province, a combined electricity and water scheme is under consideration, to cost about £20,000. At present there is no electricity supply.

Southport.—NEW CONSUMERS.—In 1933-34 the number of consumers supplied by the Electricity Department increased from 11,882 to 12,865.

Stone (Staffs).—EXTENSIONS.—The Urban District Council is to extend its supply to Aston and Little Stoke at a cost of £1,770, and to premises at Walton (£215).

Stroud.—EXTENSIONS.—The West Gloucestershire Power Co., Ltd., is to carry out a number of extensions in the area.

Sunderland.—MAINS EXTENSIONS.—The Town Council is to extend electricity mains in Lambton Street, Middle Street, and South Street.



The peacock's "pride" is successfully conveyed in this tableau at Morecambe. The illuminations continue until October 14th

Sudan.—PROPOSED ELECTRIC SYSTEM.—Specifications are being drawn up for the construction of a hydro-electric station at Bamako, on the banks of the Niger, and for the erection of a high-tension transmission line thence to Kati and Gao, important towns on the upper reaches of the River Senegal.

Taunton.—SWITCHGEAR CONTRACT.—The Town Council has approved the recommendation of the Electricity Committee to place a contract with the Metropolitan-Vickers Electrical Co., Ltd., for new switchgear and accessories as required to an amount not exceeding £2,500.

U.S.S.R.—ADDITIONAL POWER PLANT.—Preliminary work is being carried out in connection with the construction of a second hydro-electric power station on the River Svir, near Podporozhye, according to the monthly review of the Moscow Narodny Bank. The new station will be equipped with four 50,000-h.p. turbines and generators.

Wallasey.—ANNUAL REPORT.—Mr. B. T. Hawkins, electrical engineer to Wallasey Corporation, in his annual report, states that the number of consumers connected to the mains advanced 751 to a total of 24,148, including 7,991 assisted-wiring installations. The number of premises fitted under this scheme totals 8,211, but further progress cannot be looked for as practically all private dwellings and shops within the borough are now lighted electrically. The average price per kWh sold is 0.857d., against 0.754d. the previous year. This is accounted for, to a great extent, by the reduction in the low-priced bulk supply and traction load and an increase in the higher-priced domestic supplies. The new offices and showroom in Wallasey Road should be ready for opening in October. A scheme of reconstructing the industrial feeders in the Dock Road area has been carried out during the year, entailing a capital expenditure of £11,080, and the results are very beneficial and satisfactory.

Whitby.—RURAL ELECTRIFICATION.—Negotiations are being carried out by the Rural District Council to secure electricity supplies for the surrounding villages.

Wolverhampton.—CHANGE-OVER.—The Electricity Committee is to effect a change-over and erect a sub-station in the Penn Road area at a cost of £2,400.

Ceiling Reflectivity

IN April the E.L.M.A. Lighting Service Bureau published the results of tests, taken on the outskirts of Birmingham, on the reflectivity of ceilings lit by electricity and gas after varying periods of use. The Bureau has subsequently taken further tests, corroborating the figures then obtained, in blocks of flats with low rentals in East London.

As before, all of the readings were taken on a portion of the ceiling at a distance of 18 in. from the lighting fitting. While the ceiling depreciation was more rapid for both electricity and gas in the East End tests, the extra depreciation with gas lighting was the same as that recorded in the Birmingham rural area tests. With an initial reflection factor of 100 per cent. at the end of 36 months after redecoration electricity gave a factor of 62½ per cent. and gas 21 per cent. In urban areas where redecoration is advisable with electric light every two years, with gas the period should be reduced to eight months to obtain equal cleanliness, whereas in rural areas where a cleaner atmosphere lengthens the redecoration period to three years for equal cleanliness a house with gas should be done every month.

With electricity the ceiling may depreciate in three years by 38 per cent., giving rise to a reduction of illumination for general lighting fittings of some 23 per cent., whereas with gas, where the ceiling may depreciate by 79 per cent., the illumination lost is some 49 per cent.

Traction

Australia.—TRAMWAYS RECONSTRUCTION.—Provision is made in the new Victoria Budget for the payment of £50,000 to the Electricity Commission towards the cost of reconstructing the Ballarat and Bendigo tramways system. The total cost is estimated at £170,000, of which £100,000 is being advanced by the Employment Council as a loan and £20,000 is to be provided by the Electricity Commission from its own funds. The work of reconstruction has been started.

Belgium.—DIESEL-ELECTRIC COACHES.—With the object of retrieving some of the railway passenger traffic which has been lost to road vehicles, extensive experiments are to be carried out on the Belgian State railways with the running of Diesel-electric rail coaches between a number of the more important towns in the country. Approval has been given to the placing of orders for twenty-four vehicles.

Germany.—RAILWAY ELECTRIFICATION.—Work is approaching completion on the electrification of the railway between Halle, Cöthen and Magdeburg, and electric trains are expected to be in operation on the section early next month. Electricity is being supplied from the power station at Muldenstein by means of a 60,000-V transmission line.

Greece.—RAILWAY ELECTRIFICATION.—Negotiations are taking place between the British Power & Traction Finance Co. and the railway authorities regarding a loan of £3,000,000 for the electrification of the Athens-Kifissia railway.

Ipswich.—TROLLEY-BUS EXTENSIONS.—The Town Council has approved a scheme for the extension of the trolley-bus system at a cost of £18,820. It is proposed to connect up the existing termini at Felixstowe Road, Foxhall Road and Woodbridge Road by extending the routes along Bixley Road and Heath Road. The Woodbridge Road service is to be linked up with Rushmere Road by an extension along Humber Doucy Lane, and a new service is also proposed down Duke Street, Holywells Road and the new Docks Road as far as the Gainsborough Estate.

Leeds.—TRAM TRACK EXTENSIONS.—Over three miles of extensions to the Leeds Corporation tramway tracks have been recommended by the Transport Committee. On certain sections of the system, however, the trams are being replaced by buses. The recommendations provide for the construction of an express tram route, about two and a half miles in length, through the Gipton Municipal Housing Estate and the projected municipal estate at Seacroft; the provision of a tramway siding off York Road into the Gipton Estate; and the extension of the existing tramway tracks at Dewsbury Road and Balm Road. It is proposed to seek statutory authority for the tramway extensions during the forthcoming session of Parliament.

L.M.S. Railway.—ELECTRIC SIGNALLING.—More than 280 miles of wiring are involved in an important scheme of signalling alterations carried out by the L.M.S. Railway Co. between Preston and Blackpool with a view to expediting train working over this busy section. The scheme affects forty-six signal-boxes and includes, in addition to 225 miles of aerial and external wiring and 55 miles of wiring in signal-boxes, 350 electric lever locks, 1,350 relays, 226 signal repeaters and light indicators, 19 illuminated diagrams in signal-boxes, and 189 track circuits. As a result of this scheme there can now be accommodated fourteen additional trains proceeding from Blackpool towards Preston and ten in the opposite direction. Interlocking blocks provide fullest protection for trains.

Norway.—MORE ELECTRIFIED LINES.—The Norwegian State Railway Kongsberg-Hjuksebo and Notodden-Borgestad lines, near Drammen, are to be electrified. The long-projected conversion of a portion of the Ostfold railway, which forms part of the main route from Oslo to Sweden and Central Europe, is also to be undertaken. The electrification work will be completed in 1936, and the estimated cost is 7,000,000 kr., including the cost of enlarging Hakavik power station.

South Shields.—MORE TRAM TRACK.—The Town Council is to spend £3,722 on doubling the tram track in Frederick Street, South Shields.

PROFITABLE TRAMWAYS.—The report of the Transport Committee records a surplus of £133 on the trams and a loss of £1,141 on the buses.

Traffic Signals.—Automatic traffic signals are to be installed at Carfax Corner, Egham, and Virginia Water.

The Kettering U.D.C. has decided to install vehicle-actuated signals (£525).

Exeter Corporation is to install traffic signals at Polsoe Bridge and Pinhoe Road.

U.S.S.R.—THE MOSCOW "UNDERGROUND."—*Reuter's Trade Service* learns from Moscow that all the earth and concrete works have been finished on the experimental section of the underground railway at Moscow (Sokolniki-Komsomolskaia Ploshchad), the tunnel being roughly completed on a distance of 2,380 metres (about a mile and a half). Work on the section was carried out on the open-shaft system; half a million cu. m. of earth were removed and 122,000 cu. m. of concrete laid. The vaulting of the tunnel, insulating of the roof and filling up of the trenches are going on apace. By September 5th about 525 m. of rails had been laid, and the electric lighting apparatus is now being installed.

Communications

Argentina.—TELEPHONIC COMMUNICATION.—Telephonic communication has recently been established between Argentina and Uruguay by means of a cable which has been laid for the United River Plate Telephone Co. in the bed of the Plata river. The cable contains eighteen circuits of four copper wires each, and it is designed to provide for the transmission of a wide range of speech frequencies. It is about thirty-two miles long, extending from Buenos Aires to Colonia, where it connects with a 140-mile telephone line to Montevideo.

Bristol.—NEW B.B.C. STUDIOS.—The Lord Mayor of Bristol recently opened the new studios in Whiteladies Road, Bristol.

European Broadcasting.—CONFERENCE AT LISBON.—Two hundred delegates, representing twenty countries, are assembled at the old casino, Monte Estoril, for the International Committee of Radio Communications' conference. Special telephone cables are available to enable delegates to get into instant touch with their countries. The conference is divided into special committees, and it is stated that thirty-five separate problems involving for their successful solution the utmost tact are being discussed. An extensive programme of banquets and excursions has been arranged by the Ministry of Posts and Telegraphs, which now controls the broadcasting Services of Portugal. The last meeting of the International Committee was held at Oslo in 1930.—*Reuter* (Lisbon).

France.—TELEPHONE LINES.—Thirty-five important telephone lines between French towns have now been placed underground. Communications, especially in the South of France, have recently been much upset by heavy storms, which felled hundreds of telephone poles.—*Reuter* (Paris).

RADIO RELAYS.—Wireless relay systems are at present illegal in France, says the *Wireless World*. Encouraged by British and Belgian enterprises, several municipalities granted rights to private companies to organise relay systems in certain localities, but the Post Office has issued a declaration that all installations of this kind are against regulations.

RADIO AGEN.—We understand that Radio Agen, a small station at Lot-et-Garonne, is being rapidly rebuilt and will recommence transmissions at the end of this month. The station was destroyed by fire during last July.

Germany.—WIRELESS LICENCES.—The monthly return of wireless licences shows that the total on September 1st was 5,440,466. This is 82,647 more than on August 1st.

Great Britain.—RADIO RELAY EXCHANGES.—The Bradford-on-Avon Urban District Council has granted an application by the Radio Relay Exchange at Trowbridge to establish a relay service in the town. The company will pay the Council 7½ per cent. of the takings, with a minimum of £15 per annum.

The Glasgow Streets and Buildings Committee has approved of a recommendation that a wireless relay service be instituted, and that negotiations be entered into with the Broadcast Relay Services Co., Ltd., London.

NEW TELEPHONE CHARGES.—Commencing on October 1st, substantial reductions in long-distance telephone charges are being made. The full rate (9 a.m. to 2 p.m.) charges will be 2s. 6d. for 75 to 125 miles (reduction 6d.), 3s. for 125-200 miles (reduction 6d.-1s. 6d.), 3s. 6d. for 200-300 miles (reduction 1s.-2s.), and 4s. for over 300 miles (reduction 1s. 6d.-3s. 6d.). Corresponding reductions have been made in the intermediate rate and the night charge will be 1s. for any distance, which Sir Kingsley Wood believes to be unparalleled in the world. In addition, there will be a 20 per cent. reduction in rentals and deposits will be abolished, while calls to the Continent are to be cheaper. The personal call charge will be reduced to 1s. between 9 a.m. and 2 p.m.; at all other times it will be 6d. It is difficult to estimate to what extent these reductions will increase the use of the telephone, but it is estimated that they would mean a drop of £500,000 on the present traffic basis.

NEW UNDERGROUND CABLE.—According to the *Financial Times*, Sir Kingsley Wood states that a new underground telephone cable between London and Glasgow is to be laid at a cost of £2,000,000.

India.—BROADCASTING.—A message from our Bombay Correspondent says that the revenue derived by the Government from licence fees, Customs receipts and miscellaneous income connected with broadcasting is rapidly increasing. The revenue in 1933-34 amounted to Rs.5.57 lakhs and expenditure to Rs.3.23 lakhs. It is estimated that in 1934-35 the revenue will rise to Rs.7 lakhs. The Government has embarked on a programme of special measures to prevent wireless piracy.

Japan.—TELEPHONE TO MANILA.—The long-distance telephone service between Japan and Formosa and Manchukuo has been extended to Manila.

Morocco.—A LIGHTHOUSE CONTRACT.—Tenders have been invited by the French Colonial Authorities for the supply and installation of wireless transmitting sets (290-320 kc.) at the radio lighthouses at Cape Spartel, Tangier and El Hank, Casablanca, and also for plant to supply the necessary power and for the automatic control of the stations.

United States.—RADIO AMATEURS.—There are 46,390 licensed transmitting amateurs, according to the latest report of the Federal Communications Commission. America, therefore, has more transmitting amateurs than the whole of the rest of the world. The figures were 41,555 in 1933, 22,739 in 1931, and only 8,205 in 1924.—*Wireless World*.

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Argentina.—BUENOS AIRES.—October 22nd. State Oilfields. Two electrically driven pumping plants. (G.Y. 14297.)*
October 24th. Arc welding equipment. (A.Y. 12658.)*

Australia.—MELBOURNE.—State Electricity Commission. October 29th. Twelve automatic induction voltage regulators of various ratings. (A.Y. 12611.)*
November 29th. Metropolitan Tramways Board. P.i. l.c. cable. (A.Y. 12629.)* Traction sub-station units. (A.Y. 12623.)*
Posts and Telegraphs Department. October 30th. Submarine cable of various types. (A.Y. 12620.)*
November 13th. Switchboard cable. (A.Y. 12647)* (A.Y. 12648.)*
SYDNEY.—December 3rd. New South Wales Public Works Department. Hydro-electric plant in connection with the Burrinjuck water power development scheme. (A.Y. 12617.)*

Birmingham.—October 2nd. Electric Supply Department. H.p. and p.i. cables during a period of twelve months ending October 31st, 1935. (September 7th.)
October 4th. Meters as required from November 1st to April 30th next. (September 21st.)

Bridgend.—October 9th. U.D.C. H.p. overhead line, transformer kiosk and change-over switch kiosk. (September 21st.)
October 16th. Electricity Department. One 1,000-kVA outdoor type transformer and 11,000-V and 6,600-V cable. (See this issue.)

Carlisle.—September 29th. Electricity Department. Meters for the ensuing year. (September 14th.)

Chapel-en-le-Frith.—October 1st. Derbyshire Public Assistance Committee. Electric lighting installation at Poor Law Institution. Particulars from County Architect, County Offices, Derby (deposit £2 2s.).

Chester.—Electric wiring of the Lache Junior school. Particulars from C. Greenwood, city surveyor, 43, Northgate Street.

Chichester.—October 8th. City Council. Cables, switchgear, kiosks, outdoor sub-stations, &c., for the development of the south-western portion of the Council's area. (September 14th.)

Doncaster.—October 13th. Rural District Council. Electric wiring of offices. Specifications from the Consulting Engineer, 21, Temple Dale Street, Liverpool; tenders to R. Bowers, clerk, Nether Hall.

Douglas (I. of M.).—October 17th. Electricity Department. One 3,750-kW turbo-alternator and one 40,000-lb. water-tube boiler. (September 14th.)

Dundee.—October 11th. Electricity Department. E.h.p., l.c. and double steel armoured cable. (See this issue.)

Ecuador.—QUITO.—November 13th. Municipality. Electric power plant (3,000 h.p.), street-lighting equipment, &c. (A.Y. 12589.)*

Egypt.—CAIRO.—Ministry of Public Works. November 3rd. Electrical material in connection with the installation of overhead and underground networks at Barrages. (A.Y. 12591.)*
November 15th. Mechanical and Electrical Department, Ministry of Public Works. Power house equipment at Gordon's Tree Dockyard. (G.Y. 14291.)*
Ministry of the Interior. November 17th. Material in connection with the overhead and underground networks at Chebin-el-Kanater. (A.Y. 12626.)*
November 6th. Material in connection with the electrification of Kafr El Zayat waterworks. (A.Y. 12657.)*
November 10th. Material for the renewal and extension of the distribution system at Manfalout. (A.Y. 12636.)*
Ministry of Public Works. October 29th. Portable pumping set. (G.Y. 14321.)*
GIZA.—December 8th. Ministry of Public Instruction. Apparatus for the electrical laboratory of the Royal School of Engineering. (A.Y. 12577.)*
KHARTOUM.—November 20th. Sudan Irrigation Department. Power house equipment. (A.Y. 12631.)*

Felling-on-Tyne.—U.D.C. Electrical installation at fifty-three houses. Plans by C. W. Hall, surveyor, Council Offices.

Gellygaer.—October 8th. U.D.C. L.p. and e.h.p. overhead line requirements, domestic apparatus, cookers, water heaters and consumers' meters. (September 21st.)

Haverfordwest.—October 1st. Corporation. Three electrically operated water-pressure boosting pumps. Specifications from Water Engineer, Council Chamber.

India.—DELHI.—October 30th. Stores Department. Grid sub-station and local distribution sub-station, switchgear. (A.Y. 12637.)*
Switchgear for the Quadian electric supply project (A.Y. 12656.)*

Lanark.—October 2nd. County Council. Various works, including electrical, at eighty-eight houses. Particulars from P. C. Smith, county housing and town-planning engineer, 13, Clydesdale Street, Hamilton.

Leek.—October 8th. U.D.C. Electrically driven borehole pump with automatic control equipment, Venturi meter, crane and lighting and heating apparatus. Specifications from Clerk, Town Hall (deposit £3).

London.—Indian Stores Department. September 28th. Twenty-five semi-outdoor type local distribution transformers. Specifications from Director-General, Belvedere Road (deposit 5s.).
COMMISSIONERS OF HIS MAJESTY'S WORKS.—October 11th. Electric wire and cable. (See this issue.)
LEYTON.—October 10th. Electricity Department. Two 500-kVA transformers and l.p. a.c. switchgear. (See this issue.)

Manchester.—October 4th. Corporation. Heating installation at Crowcroft Park School, Longsight. Specifications from Surveyor, Education Offices, Deansgate.
October 10th. Corporation. Three-phase, 6,600-V switchgear (sheet steel cubicle type) for two years. (See this issue.)
Electricity Committee. October 10th. A.c. electric fan motors.. (See this issue.)

New Zealand.—WELLINGTON.—November 1st. Posts and Telegraph Department. Dynamos sets. (A.Y. 12592.)

Pudsey.—October 8th. Electricity Department. H.p., l.c., p.i. and steel tape armoured cable during the period ending March 31st, 1935. (See this issue.)

Rosslynlee.—September 29th. Midlothian and Peebles District Asylum. Various supplies, including electrical fittings, for six months. Forms from C. L. Addison-Smith, clerk and treasurer, 19, Heriot Row, Edinburgh.

Salford.—October 3rd. Electricity Department. 6,600/400-V 3-phase oil immersed power transformers. (September 21st.)

Shipley.—October 17th. Electricity Department. 11,000-V cable. (September 21st.)

South Africa.—CAPE TOWN.—October 24th. Electricity Department. Transformers. (A.Y. 12653.)*
JOHANNESBURG.—October 25th. City Council. Transformers. (A.Y. 12654.)*
October 27th. Switchboards. (A.Y. 12652.)*

Southend-on-Sea.—September 30th. Corporation. X-ray equipment for hospital. Specifications from Medical Officer of Health, Public Health Offices.
October 3rd. Vehicle-controlled automatic traffic signals. Specifications from borough engineer and surveyor, Municipal Buildings (deposit £1 1s.).

Stanley (CO. DURHAM).—October 4th. Electricity Department. Meters, lamps, cables and wiring supplies for twelve months. (September 21st.)

Stoke-on-Trent.—October 10th. Electrical Engineer's Department. Replacement lead battery for electric vehicle. (See this issue.)

Swansea.—October 22nd. Electricity Department. Apparatus for the remote and automatic control of four pulverised fuel-fired boilers, each having a rating of 240,000 lb. per hour, together with the necessary instruments, &c., Section "V," at the Tir John power station. Specifications, forms of tender, &c., from Preece, Cardew & Rider, consulting engineers, 8, Queen Anne's Gate, S.W.1 (deposit £2 2s.); tenders to H. L. Lang-Coath, town clerk, Town Hall, Stockport.
October 26th. E.h.p. and l.p. cables. Section "S," together with supports, pipes, trenching, &c., and the making of 400 cable boxes. (See this issue.)
October 1st. Public Assistance Committee. Wireless apparatus for Tawe Lodge. Particulars from Public Assistance Officer, Alexandra Road.

Uruguay.—MONTEVIDEO.—State Electricity Supply and Telephone Administration. October 29th. L.c. v.i.r. cables of various types. (A.Y. 12601.)*
October 31st. Knife, rotary and pear-shaped switches. (A.Y. 12600.)*

Walton & Weybridge.—October 5th. Electricity Department. L.p. cables for period ending June 30th, 1935, and laying only of such cables. (September 21st.)

Worthing.—October 8th. Borough Council. E.h.p. and l.p. switchgear. (See this issue.)

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* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Bexhill.—Electricity Committee. Accepted. Cable (£2,751).—Telegraph Construction & Maintenance Co., Ltd.

Bromley.—Town Council. Accepted. Seventy street-lighting standards (£539).—Simplex Electric Co.

Government Contracts.—The following contracts were placed by the various Government Departments during August:—

ADMIRALTY (CONTRACT AND PURCHASE DEPARTMENT).
Motors, &c., for air compressing equipment.—Laurence Scott & Electromotors.
Petrol electric mobile crane.—Ransome & Rapier.
Electric lighting fittings.—Gabriel & Co.; W. McGeoch & Co.; Player Mitchell & Breeden; Revo Electric Co.; Rainsford & Lynes.
Oil driven electric generator.—Crossley Bros. Sub-contractors for generator: G.E.C.
Steam driven electric generating sets.—W. H. Allen, Sons & Co.
Dynamos for oil driven generating sets.—W. H. Allen, Sons & Co.
Turbo-generators.—W. H. Allen, Sons & Co.; Peter Brotherhood.
Electrical equipment for lathes.—B.T.H. Co.; Met.-Vick. Elecl. Co.; Denhams Engg. Co.
Electrical equipment for milling machines.—B.T.H. Co.; Muir Machine Tools; J. Parkinson & Son.
Engine turning motors.—Veritys.
Pumps.—Drysdale & Co.
Refrigerating and ice-making machinery.—Haslam & Newton.
Automatic domestic refrigerators.—International Refrigerator Co. Sub-contractors: B.T.H. Co.
Rotor for turbo-generator.—Peter Brotherhood.
Runway and electric hoist blocks.—H. Morris. Sub-contractors for controller and resistances.—Allen, West & Co.
Switches.—Engg. & Lighting Equipment Co.; Player, Mitchell & Breeden; Telephone Manufacturing Co.

WAR OFFICE.
Batteries and cells.—Britannia Batteries; Siemens Bros.
Electric cable.—G.E.C.
Generating sets.—English Electric Co.; Ruston & Hornsby.

AIR MINISTRY.
Electric cable.—B.I. Cables.
Condensers.—Muirhead & Co.
Magneto spares.—B.T.H. Co.
Remote control equipment and spares.—Marconi's W/T Co.
Telephone cable and boxes.—Siemens Bros.
X-ray inspection set.—Philips Lamps.

POST OFFICE.
Telegraphic apparatus.—Standard Telephones.
Telephonic apparatus.—Ericsson Telephones; G.E.C.; Hall Telephone Accessories (1928); Haslam & Newton; Phœnix Telephone & Electric Works; Plessey Co.; Siemens Bros.; Standard Telephones; Telephone Manufacturing Co.
Testing and protective apparatus.—G.E.C.; Phœnix Telephone & Electric Works; Standard Telephones.
Distributing boards.—G.E.C.
Cable.—B.I. Cables; Connollys; United Telephone Cables.
Secondary cells.—Accumulators of Woking (1928); Hart Accumulator Co.
Loading coils.—G.E.C.; Standard Telephones.
Telephone cords.—B.I. Cables; Reliance Electrical Wire Co.; Siemens Bros.; Standard Telephones.
Electric lighting fittings.—Venner Time Switches.
Repairs to telephonic apparatus.—Hall Telephone Accessories (1928).
Flameproof wire.—Concordia Electric Wire Co.
Telephone exchange equipment.—Paddington (London), Birmingham, Ipswich, Wrexham.—Automatic Electric Co. Sub-contractors: Alton Battery Co. for batteries; Electric Construction Co. for motor generator. Euston (London).—Ericsson Telephones. Sub-contractors: Chloride Elecl. Storage Co. for batteries; Electric Construction Co. for motor generators and ringing machines. Uplands, Purley.—Ericsson Telephones. Sub-contractors: Chloride Elecl. Storage Co. for batteries; Crompton Parkinson for motor generator; Electric Construction Co. for ringing machines. Royal (London).—General Electric Co. Sub-contractors: D. P. Battery Co. for batteries; Crompton Parkinson for motor generator; W. Jones & Co. for ringing machines. Sutton, Evesham.—General Electric Co. Ilford, Stepney (London).—Siemens Bros. Sub-contractors: Hart Accumulator Co. for batteries; Electric Construction Co. for motor generator and ringing machines. London.—Standard Telephones. Brixton (London).—Standard Telephones. Sub-contractors: Hart Accumulator Co. for batteries; Electric Construction Co. for motor generator and ringing machines.
Telephonic repeater equipment.—London, Glasgow, Newcastle-on-Tyne, Edinburgh, Halesworth.—Standard Telephones.
Voice-frequency telegraph equipment.—Dollis Hill (London).—Standard Telephones.

CROWN AGENTS FOR THE COLONIES.
Battery materials.—G.E.C.
Copper wire.—B.I. Cables; Shropshire Iron Co.
Electrical installation for water supply.—Crossley Bros.
H.p. cables and boxes.—Callender's.
Meters.—B.I. Cables.
Steel poles and fittings.—Callender's.
Telegraph line material.—Bullers.

Grimsby.—Electricity Committee. Accepted. E.h.p. cable (£1,902).—Johnson & Phillips, Ltd.

Leicester.—Electricity Committee. Accepted. Two extension feeder units (£3,808).—Ferguson, Pailin, Ltd.

London.—ISLINGTON.—Electricity Committee. Recommended. Wiring under assisted scheme for three years (schedule rates).—E. H. Finn; A. Newton; Highbury Electrical Co.; Wells & Moulder.

Luton.—Town Council. Accepted. Street lighting standards (£142).—Siemens Bros. & Co., Ltd.

Newcastle-on-Tyne.—City Council. Accepted. Electric lighting at Victoria Jubilee Council School (£355) and Westgate Hill Council School (£286).—Falconar, Cross & Co.

Trimdon (Co. DURHAM).—Parish Council. Accepted. Extending the electric lighting system to the village, &c.—F. Reid Ferens & Co.

Forthcoming Events

Birmingham Electric Club.—Friday, September 28th. Grand Hotel, Birmingham. 7 p.m. "The Heating of Buildings by Modern Electrical Methods." Mr. E. Mac.A. Young.

Institution of Engineering and Shipbuilders in Scotland.—Tuesday, October 2nd. Institution, Glasgow. 7.30 p.m. Presidential address by Prof. J. D. Cormack. "The Acoustic Treatment of Meeting Halls." Mr. E. A. Harroway. Friday, October 12th. Grosvenor Restaurant, Glasgow. "James Watt" dinner.

Institution of Welding Engineers.—Wednesday, October 3rd. Municipal College Society, Burnley. 7.15 p.m. "Resistance Welding." Mr. P. R. Dunn. Friday, October 12th. Bacup and Rawtenstall Technical School, Bacup. 7.15 p.m. "Resistance Welding." Mr. P. R. Dunn.

Junior Institution of Engineers.—Friday, October 5th. 39, Victoria Street, S.W.1. 7.30 p.m. Informal meeting. "Random Notes on Engineering Developments in Sweden." Mr. C. H. G. Aston.

Electrical Power Engineers' Association.—(*Southern Division*).—Saturday, October 6th. Holborn Restaurant, W.C.1. 5.30 for 6 p.m. Annual dinner. (*Manchester Section*).—Saturday, October 13th. Grand Hotel, Manchester. 6.30 p.m. Social evening and dance.

Illuminating Engineering Society.—Tuesday, October 9th. Lighting Service Bureau, W.C.2. 6 p.m. Presidential address by Mr. H. Hepworth Thompson. Thursday, October 11th. Assembly Rooms, Birmingham. 7 p.m. "Reviewing Progress in Illumination." Mr. C. W. Sully.

Electrical Association for Women.—Wednesday and Thursday, October 10th and 11th. 20, Regent Street, S.W.1. 3 p.m. "Table Cookery for Kitchenette and Dining Room." Miss D. Vaughan.

Association of Supervising Electrical Engineers.—Saturday, October 13th. First Avenue Restaurant, W.C.1. 6.30 p.m. Dinner and dance.

Notes

The Hairdressing Fair

There is a good deal to be seen of electrical interest at the Hairdressing Fair, which opened at Olympia last Tuesday and which will continue until next Thursday. Apart from the usual electrical accessories such as those for permanent and iron waving, hair-cutting and hair-drying, shown by Ettinger et Cie, John A. Fransen, Ltd., Gallia, Ltd., Halliwell & Co'., Ltd., Osborne, Garrett & Co., Ltd., Stecklyns Fittings, Ltd., a number of concerns display, in addition, other products only incidentally connected with hairdressing. Prominent among these is L. G. Hawkins & Co., Ltd., who show a wide range of their domestic appliances, including a washing machine, fires, vacuum cleaners, floor polishers, vibrators and high-frequency apparatus, lighting fittings, kettles and irons. M. Calderon has an additional display of high-frequency generators and appliances and electrolysis and faradic treatments. I. Calvete, Ltd., exhibit, as extras, vibratory massage and high-frequency violet-ray apparatus, as also do the Dexter Manufacturing Co., Ltd. Nageles are also giving demonstrations of the "Thor" washer. Examples of electric signs appear on the stands of Commercial Displays, Dudley & Co., Ltd., as well as on that of R. Hovenden & Sons, Ltd., which features everything electrical for the hairdresser. H. E. Jarvis & Co., Ltd., also emphasise the electrical aspect of their exhibit, which is again evident in the display of the Salon Electrical Co. Pictures appear on page 409.

Two E.P.E.A. Events

The annual dinner of the Southern Division of the Electrical Power Engineers' Association will be held on October 6th at the Holborn Restaurant. Tickets (8s. 6d. each for members and their ladies, and 10s. 6d. for non-members) can be obtained from the hon. secretary, Mr. F. H. Smethurst, "Tremorvah," Lynton Road South, Gravesend.

A social evening and dance has been arranged by the Manchester Section of the Electrical Power Engineers' Association for October 13th at the Grand Hotel, Manchester. Tickets (3s. 6d. each) can be obtained from Mr. F. Kilben, hon. secretary, Organisation Sub-Committee, "Roche Vale," 369, Rochdale Road, Bury, or from members of the Section Committee and sectional technical representatives.

The Birmingham Electric Club

The 1934-35 session of the Birmingham Electric Club opens to-night (Friday) when Mr. E. Mac.A. Young will read a paper on "Heating of Buildings by Modern Electrical Methods." Arrangements for the remainder of the session include the following:—October 19th: Ladies' night. October 26th: "Traffic Control Signals," by F. G. Tyack. November 23rd: "Protection of Electrical Circuits by High Rupturing Capacity Fuses," by A. M. Pooley. December 14th: Annual meeting. January 25th: Presidential address. February 22nd: "Points of View on Tariffs." March 8th: Annual dinner. March 22nd: "Specifications," by F. M. Lea.

Midland Electrical Engineers' Ball

This annual ball will again be held in the Grosvenor Suite at the Grand Hotel, Birmingham, on November 16th, under the presidency of Mr. S. T. Allen, Central England Engineer, Central Electricity Board, Birmingham. The chairman of the Committee is Mr. W. H. Heaton, and the hon. secretary, Mr. W. Y. Anderson. Application for tickets should be made to any Committee member.

The I.E.E. Programme

The presidential address to the Institution of Electrical Engineers will be delivered by Professor W. M. Thornton on October 25th. Other meetings arranged for the first half of the 1934-35 session include the following:—November 8th: "Hydro-electric Development in Great Britain, with Special Reference to the Works of the Grampian Electric Supply Co.," by A. E. Valentine and E. M. Bergstrom. November 22nd: "Generation, Distribution and Use of Electricity on Board Ship," by C. W. Saunders, H. W. Wilson, and R. G. Jakeman. December 6th: "A Critical Examination of the Present Practice relating to the Electrical Warming and Air-Conditioning of, and the Supply of Hot Water to, the Larger Buildings," by R. Grierson and D. Betts. December 20th: "The Organisation of Electricity Supply in New Zealand," by F. T. M. Kissel. January 10th: "Electrical Development in the U.S.S.R." by A. Monkhouse.

Appointments Vacant

Mains engineer for Cleethorpes U.D.C. Electricity Department.

Assistant visiting teachers for evening classes at Paddington Technical Institute, W.9, for London County Council.

Two junior charge engineers in the Gunwharf Road generating station for Portsmouth Electricity Department.

(See our classified advertisements.)

Makers' Names Wanted

MAXIVEE switches.
ALBECO electric light fittings.
GEHAL or CEHAL electric kettle.
NONOX batteryless electric lamp.

Our Personal Column

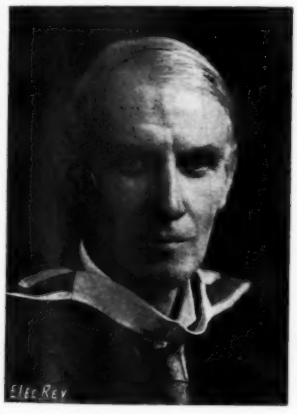
Electrical men are invited to keep readers of the "Electrical Review" posted concerning their movements

Mr. V. Z. de Ferranti, in addressing shareholders of Ferranti, Ltd., at the annual meeting expressed regret, in which we all join, at the absence of **Mr. R. H. Schofield** owing to illness. Mr. Schofield, who has been a member of the staff of the company for nearly forty years, was elected to the board a few months ago, and Mr. Ferranti took advantage of the opportunity presented by the meeting to welcome him as a director and to mention that he had largely contributed to the building up of the company's business. The chairman added the hope that he would be able to give them the advantage of his unrivalled experience of the electrical industry for many years to come.

Mr. A. M. Bell, public lighting superintendent of the Tottenham & District Gas Co., will be president of next year's conference of the Association of Public Lighting Engineers, which will be held in London.

Dr. J. D. White, who in 1931 succeeded Dr. J. Woodburn Morrison in charge of the Radiological Department of the Royal Infirmary, Edinburgh, has been appointed director of the Radiological Department of the Hammersmith Hospital (British Post-Graduate Medical School) and Consulting Radiologist to the London County Council. Dr. White graduated M.B., Ch.B., at Edinburgh University in 1917, and D.M.R.E. at Cambridge in 1921. He has acted as radiologist at the Brompton Hospital and assistant radiologist at St. George's Hospital, London.

Mr. F. Peake Sexton, A.R.C.S., A.M.I.E.E., the author of the article on "Contractors and the Commissioners' Regulations," which appears on page 398, was educated privately and at the Imperial College of Science. He commenced his career as engineer to the Electric Tested Lamp Co. He has been a demonstrator at the Imperial College of Science, lecturer in experimental physics at Woolwich Polytechnic and lecturer in electrical engineering and physics at the Central Technical Schools for Cornwall. For a short period he was engaged in research work at the National Physical Laboratory, and during the war was technical assistant to Mr. S. G. Brown, with whom he was mainly concerned with the development of a gyro-compass. Since 1910 he has been actively engaged in contracting work with the Thames Electric Co., Ltd., of which he is founder and managing director. He is also lecturer on electrical installation work at the Battersea Polytechnic.



[*Lafayette*
Mr. F. Peake Sexton

During the annual conference of Public Lighting Engineers at Aberdeen last week a message of good wishes was telegraphed to **Lieut.-Commander Haydn T. Harrison,** who was absent owing to ill-health, asking him to accept honorary membership of the Association in recognition of the important work that he had done for the organisation.

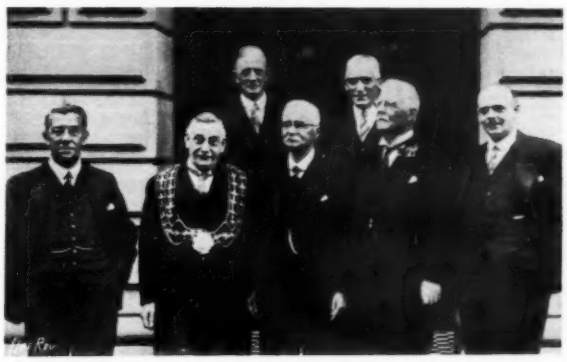
Mr. J. D. Spark, deputy electrical engineer at Willesden, has been appointed borough electrical engineer and manager in succession to the late Mr. A. W. Blake.

Mr. William Davies has been appointed working electrical engineer in charge to the Tredegar Urban District Council in connection with its electricity scheme. There were sixty-two applicants for the post. Mr. Davies has contributed articles on coal-face lighting and urban-district wiring to the ELECTRICAL REVIEW. He took up his duties this week.

Mr. R. C. Carter has relinquished his position as director and secretary of the Ray Engineering Co., Ltd., of Bristol, as from September 15th. **Mr. R. E. Joy** will continue to act as managing director, and Mr. Carter's successor as secretary will be **Mr. J. E. Evans,** who has acted as sales engineer for the company for some time.

Mr. L. A. Booth, who has been elected chairman of the Association of Supervising Electrical Engineers, joined the Association in 1929. In March, 1931, he was elected to the Board of Control, and became a vice-chairman in April, 1933. Prior to his election to the Board of Control he was chairman of the Electrical Contracting Section, a position which he held for a number of years. Mr. Booth is the London manager of Messrs. Johnson & Phillips, Ltd.

Prof. E. V. Appleton was elected president of the International Scientific Radio Union at the concluding meeting of the conference held in London last week. He succeeds **Prof. A. E. Kennelly,** of the United States, who has retired



A group at the Halifax Electrical Exhibition **(See page 416)**
Left to right: Sir Felix Pole, Coun. F. A. Leach (Mayor of Halifax), Coun. E. Midgley, Mr. W. Emmott, Mr. G. A. Vowles (Halifax electrical engineer), Ald. T. Hey and Mr. M. F. Farrar

owing to ill health, and he will hold office until the end of the next congress, which it is anticipated will take place abroad in 1936 or 1937. The *Times* reports that the presidents of the five commissions into which the Union is divided were elected as follows: Commission I (Radio-frequency Standards), Dr. E. H. Rayner (Great Britain); Commission II (Propagation of Waves), Dr. J. H. Dellinger (U.S.A.); Commission III (Aatmospherics), Professor E. V. Appleton (Great Britain); Commission IV (Liaison with Amateurs, &c.), Professor R. Mesny (France); and Commission V (Radio-physics), Dr. B. van der Pol (Holland).

Mr. H. H. Broughton, consulting engineer, is removing on September 29th to 12-15, Dartmouth Street, Queen Anne's Gate, S.W.

With reference to a paragraph published on page 357 of our issue of September 14th, in order to avoid confusion, we wish to make it clear that **Mr. Andrew S. Tait** has been appointed general manager of the English Electric Co. *of Canada,* Ltd.

Obituary

Mr. E. G. Taylor.—We regret to record the death of Mr. Edward Garfield Taylor, who had been associated for many years with the British Thomson-Houston Co.'s export work, and with the recreation of B.T.H. employés. He was spending a holiday at Filey, when he was taken ill and was transferred to a nursing home in Leeds, where he died on September 17th. After completing his education at King's College, London, Mr. Taylor entered his father's boiler works in Yorkshire; later he entered the electrical engineering works of Siemens Brothers at Stafford, and joined the B.T.H. Company in 1904 as a tester in the Rugby Works. In 1906 he was transferred to the Export Department, and had been engaged on export work ever since, being principal assistant to the Company's export sales manager for a number of years. In this capacity he visited Russia in the early days of the war, and immediately after the war he made an extended trip to India. He took a keen interest in outdoor sports, and was a vice-president of the B.T.H. Recreation Club and for many years a member of its executive committee; for three years in succession he was the Club's chairman, and he was also chairman of the cricket section.

The late Mr. E. G. Taylor

Major J. S. Liddell.—The death is announced of Major J. S. Liddell, C.M.G., D.S.O., R.E. (late of Egyptian State Telegraphs), which occurred in London on September 19th.

Mr. A. W. Hibberdine.—The death occurred suddenly on September 18th, at his home at Radlett, Herts, at the age of fifty-four, of Mr. Alfred William Hibberdine, who had been intimately connected with telegraphy for the last thirty-nine years, commencing his career with the Eastern Telegraph Co. in 1895. He was appointed traffic accountant of that Company in 1919, and when the cable and wireless merger took place he was appointed general manager (Communications) of Imperial & International Communications, Ltd., now known as Cable & Wireless, Ltd. During his long and distinguished career in the telegraph world Mr. Hibberdine was a familiar figure at the various International Telegraph Conferences, and he also travelled in many parts of the world on business connected with his group of companies. He leaves a widow and a son who is in the service of Cable & Wireless, Ltd. He was in his office, apparently in the best of health, on the day of his death.

The late Mr. A. W. Hibberdine

Mr. A. E. Pettifer.—The death is announced of Mr. Albert E. Pettifer, of Bromyard, who was the first to supply the town with electricity as a public supply. The concern was eventually taken over by the Shropshire, Worcestershire & Staffordshire Electric Supply Co.

Mrs. Pickersgill.—We regret to record the death of Mrs. Alice Pickersgill, wife of Mr. A. Pickersgill, engineer and manager of the Spenborough Council's Electricity Department. Mrs. Pickersgill, who was sixty-two years of age, was well known in electrical circles, and was frequently present at annual conferences. She was one of the founders of the Electrical Association for Women, and at the time of her death was a member of the Executive Committee of the Leeds Branch.

Mr. E. R. Brighten.—The death occurred at St. Leonards-on-Sea, on September 19th, of Mr. Edgcumbe Rendle Brighten, in his forty-ninth year.

Will.—Col. G. R. C. Westropp, a director of the Madras Electric Supply Corporation, Ltd., and the Madras Electric Tramways (1904), Ltd., left £212,500 (net personalty £209,951).

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

Fielding Signs & Electric, Ltd.—Public company. Registered September 19th. Capital, £500 in 5s. shares (1,000 ordinary and 1,000 7½ per cent. participating preference). Objects: To acquire the undertaking and assets of James Fielding & Co., carrying on business at Sidney Street, All Saints, Manchester, and at Salford, to undertake the whole or part of the liabilities of that company, and to carry on the business of manufacturers of and dealers in electric signs of every description, dealers in and warehousemen and merchants of electric signs, lamps and fuses, enamel service signs, advertising, illuminated bowl, electric flashing, neon electric, and daylight signs, night signs fitted with reflex lenses of every description, &c. The first directors are: J. Fielding, 4, Vicarage Avenue, Cleveleys, and J. Sutcliffe, 5, Mount Road, Fleetwood. Registered office: 46, Sidney Street, All Saints, Manchester, 1.

Weston Wireless, Ltd.—Private company. Registered September 14th. Capital, £100 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in wireless, telegraph and telephony apparatus, instruments and appliances, &c. The permanent directors are: Maj. F. R. Samson, Bluevines, Queens Road, Weybridge, Surrey, and A. G. Gasparro, 30, Ray Street, Farringdon Road, E.C.1. Registered office: 20, Alpha Place, King's Cross, N.1.

Norwich Relays, Ltd.—Private company. Registered September 19th. Capital, £7,000 in £1 shares. Objects: To acquire the benefit of an agreement dated August 20th, 1934, between the Corporation of Norwich and St. Andrews Wireless Depot, Ltd.; and to carry on the business of distributors and relayers of wireless telegraphy, telephony or other programmes, &c. The first directors are: S. E. Hill, 53, Gipsy Lane, Norwich, and two others. Solicitor: Claude Stratford, Norwich.

Trutolife Television Co., Ltd.—Private company. Registered September 19th. Capital, £3,000 in £1 shares. Objects: To carry on the business of manufacturers of television transmitting and receiving sets, of all component parts thereof, including neon lamps, cathode-ray tubes and photo-electric cells, &c. The subscribers are: H. C. Rawson, Hawthorns, Dore Road, Dore, nr. Sheffield, and W. G. Baxter, 155, Norfolk Street, Sheffield. Secretary: H. C. Rawson.

Neon Erectors, Ltd.—Private company. Registered September 14th. Capital, £3,000 in £1 shares (2,000 preference and 1,000 ordinary). Objects: To carry on the business of electrical sign makers, sign writers, poster painters and printers, advertising specialists, &c. The first directors are: H. C. Dixon, and two others. Registered office: 76, Rosamond Street East, Manchester.

Morgan & Waddington (1934), Ltd.—Private company. Registered September 11th. Capital, £100 in £1 shares. Objects: To carry on the business of electrical, wireless, television, mechanical and general engineers, engineering contractors, &c. The directors are: A. Stenson, 38, Conway Grove, Harehills, Leeds, and J. A. Blackburn, 31, St. Alban Road, Harehills, Leeds. Solicitors: Joseph Wurzal & Co., 68, Albion Street, Leeds.

Sam Weller & Co., Ltd.—Private company. Registered September 10th. Capital, £100 in £1 shares. Objects: To carry on the business of manufacturers and repairers of and dealers in electrical, mechanical and photographic apparatus, wireless and radio sets, radio-gramophones, &c. The first directors are: R. J. T. Weller and Ethel A. Weller, both of 508a, Hornsey Road, N.19. Registered office: 508a, Hornsey Road, N.19.

Bearings, Ltd.—Private company. Registered September 15th. Capital, £100 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in wireless sets and all articles allied thereto, &c. The first directors are: W. M. Foster, 77, Lancaster Gate, W.2; H. Lloyd, 1, Lancaster Gate, W.2.

Returns of Electrical Companies

British Aluminium Co., Ltd.—Particulars have been filed of debenture stock to secure £3,500,000 and premium of 2 per cent. authorised June 12th, 1934, and secured by trust deed dated September 12th, 1934, the whole amount being now issued. Property charged: Freehold and leasehold property in England, leasehold property in Northern Ireland, heritable property in Scotland, leases of properties in the Gold Coast Colony, 500 fully paid shares of £10 each in the Loch Leven Electricity Co., Ltd., 5,000 fully paid shares of £10 each in the Loch Leven Pier Co., Ltd., and the company's undertaking and other property, present and future, including uncalled capital, if any (subject to trust deed dated April 10th, 1931). The trustees are the Trustees Corporation, Ltd., of Winchester House, Old Broad Street, E.C.

North British Aluminium Co., Ltd.—A trust deed dated September 12th, 1934, to secure £3,500,000 debenture stock and premium of 2 per cent. of the British Aluminium Co., Ltd., has been registered. Property charged: Shares and debenture stock of the Lochaber Power Co., heritable properties in Scotland, and the company's undertaking and other property, present and future including uncalled capital, if any (subject to trust deed dated February 17th, 1925, as modified by supplemental deed dated September 20th, 1932). The trustees are the Trustees Corporation, Ltd., of Winchester House, Old Broad Street, E.C.

Kalgoorlie Electric Power & Lighting Co., Ltd.—Capital, £125,000 in 5 preference shares of £1 and 249,990 ordinary shares of 10s. Return dated May 31, 1934. 5 preference and 100,000 ordinary shares taken up. £3 10s. paid on 7 ordinary shares. £50,001 10s. considered as paid on 5 preference and 99,993 ordinary shares. Mortgages and charges, £75,079. A return of allotments, made up to July 24th, 1934, shows a further 100,000 ordinary shares allotted, payable in cash and fully called up.

Calcutta Electric Supply Corporation, Ltd.—Supplemental trust deed created outside the United Kingdom dated September 1st, 1934, securing an issue of 700 second mortgage debentures of Rs.1,000 each originally issued by the Bhatpara Power Company, Ltd. Property charged: The undertaking and assets acquired from the said company and certain lands in Bhatpara. Trustees: H. P. Sutcliffe, 26, Dalhousie Square, Calcutta, and T. Lamb, 2, Hare Street, Calcutta.

Madras Electric Supply Corporation, Ltd.—Capital, £1,100,000 in 476,800 preference and 623,200 ordinary shares of £1 each. Return dated June 20th, 1934. 451,800 preference and 598,000 ordinary shares taken up. £944,000 paid on 398,600 preference and 545,400 ordinary shares, £106,000 considered as paid on 53,200 preference and 52,800 ordinary shares. Mortgages and charges, nil.

Yorkshire Traction Co., Ltd.—Capital, £250,000 in 50,000 7 per cent. preference and 200,000 ordinary shares of £1 each. Return dated May 21st, 1934. 24,350 preference and 150,000 ordinary shares taken up. £148,315 paid on 22,350 preference and 125,965 ordinary shares. £26,035 considered as paid on the remainder. Mortgages and charges, nil. Return of allotments made up to August 30th, 1934, shows a further 50,000 ordinary shares allotted as fully paid.

Searchlight, Ltd.—Debenture dated August 30th, 1934, to secure £6,000, charged on the company's undertaking and property, present and future, including uncalled capital. Holders: Mrs. A. M. Allen, "Highbury," Rowley Regis, Staffs, and B. H. Bate, "Lydiate House," Belbroughton, Worcs.

Yorkshire Traction Company, Ltd.—The nominal capital has been increased by the addition of £50,000 in £1 ordinary shares beyond the registered capital of £200,000.

Wembley Relay Service, Ltd.—Particulars filed of debentures to secure £1,500 and premium of 2½ per cent. authorised September 10th, 1934, charged on the company's undertaking and property, present and future, including uncalled capital, the amount of the present issue being £500.

Pendleton Electrical & Wireless Co., Ltd.—The nominal capital has been increased by the addition of £900 beyond the registered capital of £100. The additional capital is divided into 700 ordinary and 200 deferred shares of £1 each.

Harvey-Thompson Accumulator Service, Ltd.—The nominal capital has been increased by the addition of £1,000 beyond the registered capital of £4,000. The additional capital is divided into 1,000 6 per cent. cumulative preference shares of £1 each.

Edison Swan Electric Co., Ltd.—Capital, £432,565 8s. in 100,000 7½ per cent. cumulative preference shares of £1 and 1,662,827 ordinary shares of 4s. Return dated June 8th, 1934. 100,000 preference and 957,177 ordinary shares issued and fully paid up. Mortgages and charges, £217,385.

Wisbech Electric Light & Power Co., Ltd.—The nominal capital has been increased by the addition of £15,000 in £1 ordinary shares beyond the registered capital of £45,000.

Northern Electrical & Ventilating Co., Ltd.—H. P. Jones, of 8, Haymans Green, West Derby, Liverpool, ceased to act as receiver and manager on September 17th, 1934.

A. Melville Sidley, Ltd.—Capital, £1,000 in £1 shares. Return dated June 26th, 1934. 676 shares taken up. £127 paid. £549 considered as paid. Mortgages and charges, nil.

Sunbeam Vacuum Cleaner Co., Ltd.—Satisfaction in full on September 8th, 1934, of debenture dated June 5th, 1934, and registered same date securing £1,300.

South African Lighting Association, Ltd.—Capital, £100,000 in £10 shares. Return dated June 13th, 1934. 9,000 shares taken up. £88,950 paid, £1,050 considered as paid. Mortgages and charges: £30,000.

Llangollen & District Electric Light & Power Co., Ltd.—Capital, £6,000 in 3,500 ordinary and 2,500 preference shares of £1. Return dated June 15th, 1934. 360 preference and 1,753 shares taken up. £2,113 paid. Mortgages and charges: £1,600.

Siemens & General Electric Railway Signal Co., Ltd.—Capital, £20,000 in 10,000 "A" ordinary and 10,000 "B" ordinary shares of £1. Return dated June 27th, 1934. 3,500 "A" and 3,500 "B" shares taken up. £7,000 paid. Mortgages and charges, nil.

Halcyon Wireless Co., Ltd. (old company).—F. E. Bendall, of Midland Chambers, Warwick Passage, Corporation Street, Birmingham, ceased to act as receiver and manager on September 11th, 1934.

Wigtownshire Electricity Co., Ltd.—Capital, £40,000 in £1 shares. Return dated June 28th, 1934. All shares taken up. £40,000 paid. Mortgages and charges, nil.

A. W. Penrose & Co., Ltd.—Capital, £45,000 in 10,000 1st preference, 5,000 2nd preference, and 30,000 ordinary shares of £1. Return dated June 8th, 1934. 10,000 1st preference, 500 2 preference, and 30,000 ordinary shares taken up. £10,507 paid, £29,993 considered as paid. Mortgages and charges, nil.

Sheffield Welders, Ltd.—Satisfaction in full on August 28th, 1934, of mortgage dated July 1st, 1927, and registered July 11th, 1927. (According to the register of mortgages, the mortgage registered July 11th, 1927, originally secured all moneys due to bank.)

City Notes

Ferranti, Ltd., held their annual meeting on September 21st. In presenting the report and accounts (ELECTRICAL REVIEW, September 21st, p.) Mr. V. Z. de Ferranti said the turnover of the business for the year under review had shown a small reduction, as compared with the previous year, owing to the completion of the large contracts for the grid early in the year, but the Central Electricity Board had placed a further order for three 60,000-kVA transformers with them, and there had been a welcome increase in orders from abroad. Their radio and electric fire departments had commenced their seasonal operations earlier and on a much larger scale than last year, so that they were employing at present at Hollinwood over 6,500 people, the greatest number in their history. Unless there was some radical invention in radio design which would cheapen manufacturing costs very appreciably, it was safe to prophesy that radio prices would not go any lower than they were to-day. The reason why values given were so high was due to the enormous hold that wireless had on the public, which reflected in an ever-increasing demand for sets. They seemed to have reached a stability of broadcasting conditions which enabled them to improve quality of reproduction rather than to strain for selectivity and range of reception. The new range of synchronous electric clocks of modern design that they had recently introduced had been well received, and the public was becoming more electric-clock-minded each day. In moving the re-election of Mr. R. H. Schofield to the board the chairman expressed his regret at Mr. Schofield's absence from the meeting owing to illness, and referred to his value to the company, with which he had been connected for nearly forty years.

The Palestine Electric Corporation reports a net profit of £P.80,887 for 1933 (against £P.24,341 for 1932). General reserve receives £P.30,000 and a dividend of 5 per cent. is paid on the ordinary shares (against nil), leaving £P.34,050 to be carried forward. The sales of electricity during the year totalled 20,136,839 kWh, against 11,590,350 kWh for the previous year, being an increase of 74 per cent., and the number of consumers rose by 6,821 to 21,934, an increase of 45 per cent. To provide for the capital outlay involved in the construction of a new steam turbine power house at Haifa and in the carrying out of further extensions of the transmission and distribution lines, an issue of an additional 300,000 ordinary shares will shortly be made.

The Telephone Co. of Pernambuco reports that although the operating revenues for 1933 increased, these revenues when expressed in sterling amounted to £27,167, a decrease of 3.7 per cent. The loss for the year was £3,399, which with the debit brought in, makes a total deficit of £22,045. A credit of £10,820 in the difference in exchange has been applied as a separate item, against the total debit in the revenue account, leaving a debit of £11,225.

The Sun Electrical Co., Ltd., report a trading profit for the year ended April 30th last of £18,113, as compared with £17,492 in the preceding year. After providing for depreciation, &c., there was a net profit of £15,704 (against £14,794), to which is added £5,348 brought in. The ordinary dividend is maintained at 5 per cent. and £4,012 is carried forward. Meeting: To-day (Friday).

Broadcast Relay Service, Ltd., is issuing to shareholders 222,200 ordinary shares of 1s. each at a premium of 3s., which will increase the issued capital to £66,660. The new shares will rank *pari passu* with existing shares as from March 31st last.

John Ismay & Sons are offering shareholders 50,000 6½ per cent. preference £1 shares at 21s. each. The offer is open to both classes of shareholders, but preferential consideration will be given to preference shareholders.

The British Aluminium Co. announces that it has decided to await the full year's trading results before consideration of the payment of a dividend upon the ordinary share capital. A similar decision was made last year and a dividend of 5 per cent. was paid for 1933.

Companies to be Struck off the Register.—The names of the following companies will be struck off the Register at the expiration of three months unless cause is shown to the contrary:—County Electrical & Wireless Stores, Ltd.; Radio Electric Co. (Bournemouth), Ltd.; Union Electric Co., Ltd.; Wynsor Electric Range Co., Ltd.

Companies Struck off the Register.—The names of the following companies have been struck off the Register and they are thereby dissolved:—Abbey Cables, Ltd.; American Radio Corporation, Ltd.; Electric Carbons & Supplies, Ltd.; Thermal Electric Works (Hackbridge), Ltd.

Edgar Allen & Co. announce that they have decided to defer payment of the dividend on the 5 per cent. cumulative preference shares in respect of the half-year to September 30th. The directors state that although trade conditions have improved considerably they feel it is necessary to conserve the company's resources.

The International Automatic Telephone Co., Ltd., has declared an interim ordinary dividend of 3 per cent. (same).

The West London & Provincial Electric & General Trust, Ltd., is again paying an interim dividend of 1½ per cent. on the ordinary shares.

Stewarts & Lloyds, Ltd., has declared dividends at the rate of 6 per cent. per annum on the first preference, 10 per cent. per annum on the second preference, and 5 per cent. per annum on the third preference shares, all less tax.

The Midland Counties Electric Supply Co., Ltd., is maintaining its interim dividend at 2½ per cent., less tax.

The Midland Electric Corporation for Power Distribution is again paying an interim dividend of 3 per cent. on the ordinary shares.

Stocks and Shares

TUESDAY EVENING.

GENERAL conditions in the Stock Exchange Markets are in favour of present holders of shares, but they render it a matter of difficulty to place investment money to the advantage of those wishing to use it. Gilt-edged stocks in the list of British Government securities stand at something like record prices. This is reflected in the groups of other Safety First securities. To all appearance, the march of British credit is towards a 3 per cent. level. In fact, this might almost be said to have come into practical effect, although the War Loan still pays about 3½ per cent. on the money. The various stocks of public boards, such as Central Electricity and London Passenger Transport, give returns ranging from 3½ to 3¾ per cent. when redemption is taken into account, although the flat yields are, of course, rather more. London Passenger Transport "A" stock has risen to 121¼. There continues to be a fair demand for the "C" stock, which has hardened to 82. The latter stock would be more popular if the Board decided to pay dividends half-yearly. Many people have a natural objection to waiting twelve months between the receipt of dividends. Of the Board's 5 per cent. "B" 1965-2023 stock, £1,500 is on offer at 126. This would give 4 per cent. as a running yield, £3 12s. per cent. allowing for redemption.

The Borough of Barnes has under contemplation a proposal that the Transport Board shall be approached with a recommendation that the Piccadilly Tube shall be extended to Barnes, East Sheen and Mortlake, a project which sounds more picturesque than its fulfilment seems probable.

Gilt-edged Risks

The tendency of the gilt-edged markets emphasises the desirability of drawing attention to the high prices at which

a number of electrical debenture stocks are standing, more particularly in cases where the stocks are subject to drawings at 100. London Power 5 per cent. debenture can be drawn at 100, and the present price is 108. The risk of having the stock paid off at 100 is comparatively small at present, owing to the large amount of stock issued. There is nearly 16 million pounds of the stock in the hands of the public. Last year the drawing was 3 per cent. of the total amount, and, if the next drawing is at the same ratio, this would mean little more than £450,000 being repaid out of the total amount of the loan. Many people would consider that the risk of holding the stock is worth the running, in view of the yield obtainable from so excellent a security. Similar conditions apply in the case of Metropolitan Electric 7½ per cent. debenture, North Metropolitan Power Station 5 per cent. debenture, and others mentioned here recently. It would be merely tautological to revert to the point were it not for the fact that conversion schemes are very popular just now, and that borrowers are showing themselves alive to the opportunities which present-day conditions present for them to reduce the rate of interest which they now pay on their stocks.

Home Electricity Supply Shares

This week a number of the ordinary shares in the London Electricity Supply group have moved up to the extent of a further 6d. or so. The advance places the list of shares upon an approximate yield-level of little more than 4 per cent. on the money. Having regard to the pressure of investment demand to-day, no surprise would be felt if the current prices should be further augmented. Rises, it will be noticed, have occurred in the ordinary shares of the Brompton, Charing Cross and Chelsea companies, while deduction of various dividends on the Monday in this week has produced no quotable changes. The provincial group shows robust strength, and amongst the "foreign" issues, Whitehall Electric preference at 22s. ex dividend are higher by the amount of the distribution. Tokyo Sixes at 82 have sympathised in a general improvement amongst Japanese bonds.

Cables and Wireless

Publication of a satisfactory monthly ratio by the Cables & Wireless Combine had an instantaneous effect upon the market in the stocks. The 5½ per cent. preference rose 3½ to 77½, the "A" stock is 2 points higher at 18; the "B," at 8½, shows a gain of the fraction. So great is the difficulty experienced in obtaining preference stocks in which there is a prospect of capital appreciation and increased dividend that Cables & Wireless preference makes a popular appeal. The market has become more active than it was. Past experience has shown, however, how capricious the movements in Cables & Wireless stocks can be. The buyer at to-day's prices must be prepared to put away his purchases for future reference, indifferent to reactions which may occur from time to time.

Globe ordinary advanced in sympathy with the strength of the Cables & Wireless group. The preference remain unchanged at 12½. American Telephone & Telegraph is 2 points higher, and International Telephones strengthened to 10¼. Marconi Marines are better at 32s. 6d.

Manufacturing and Equipment

Amongst the features of the Stock Exchange markets at the moment, one of the chief is the activity noticeable in the shares of industrial and manufacturing companies. People are buying shares hand over fist, as the saying goes, and the enquiry extends to practically every branch of the industrial world. Electricity and cable equipment shares are receiving close attention. Aron Electricity have spurted to 65s., showing a substantial gain on the week. Crompton Parkinsons are better at 27s. 6d. Johnson & Phillips attracted buyers at the same price. Henley's are harder at 6¼. Active demand for Electrical & Musical Industries raised the price to 32s. 3d. Ericsson Telephones have risen to 76s. 6d. International Automatic Telephones at 35s. 3d. recovered most of the deducted dividend. The demand runs strongly for shares in the industrial companies whose prospects of paying increased dividends are considered to be promising.

A Rise of Fifty

From the spectacular point of view, the rise of 50 points in British Electric Traction deferred stock stands out as being the principal movement of the week. The company's assets are declared to have increased so substantially in value during the past six months as to make the deferred stock cheap at anything round the present exalted level. As an instance of the catholicity of its interests, it may be mentioned that the company has just entered into an agreement with Advance Laundries, Limited, undertaking to subscribe for such new shares as shall not be taken up by the proprietors in the Advance Company. Amongst other transport issues, Brazilian Tractions have been a good spot, the price improving to 12⅛ on substantial American buying before it reacted to 11¾, which left the price ⅛ higher on balance. Anglo-Argentine Tramways 5 per cent. debenture has gained a couple of points. No further alterations have occurred in Mexicans. The dollar stocks of the Canadian and American Utility companies have gained a little strength, for which the reported termination of the strike in the United States is the principal reason.

Share List of Electrical Companies

Home Electricity Companies.

	Nom.	Dividend. 1932.	Dividend. 1933.	Price. Sept. 25.	Rise or Fall.	Yield p.c. £ s. d.
Bournemouth and Poole	1	15	15	78/9	—	3 16 1
Brompton Ordinary	1	7	7	34/6	+6d.	4 1 2
Charing Cross Ordinary	1	7	7	35/–	+6d.	4 0 0
Chelsea	1	7	7	34/6	+6d.	4 1 2
City of London	1	7½	7½	36/3	—	4 2 9
Clyde Valley	1	7	7	38/9	—	3 12 5
County of London	1	10½	10½	57/6	—	3 13 1
Edmundson's 7% Pref.	1	7	7	34/6	—	4 1 2
Elec. Dis. Yorkshire	1	9	9	48/9	+⅛	3 14 0
Elec. Supply Corporation ...	1	11	11	58/9xd	—	3 14 10
Kensington Ordinary	1	7	7	34/6	+6d.	4 1 2
Lancs Light and Power	1	7	7½	37/6xd	+6d.	4 0 0
London Electric	1	7	7	34/6	+6d.	4 1 2
Metropolitan	1	10	10	53/9	—	3 14 6
Midland Counties	1	7	7	37/6xd	+6d.	3 14 0
Mid. Elec. Power	1	8	8	42/9xd	+6d.	3 13 2
North Eastern Electric Ordinary	1	6	6	33/–	—	3 12 10
Do. 7% Pref.	1	7	7	35/–	—	4 0 0
Northampton	1	10	10	52/6	–6d.	3 16 2
Notting Hill 6% Pref.	10	6	6	14½	—	4 4 4
North Met. Elec. Ordinary ...	1	10	10	3½	+⅛	3 4 0
Do. do. 6% Pref.	1	6	6	31/6	—	3 16 2
St. James' and Pall Mall ...	1	7	7½	36/6	+6d.	4 2 2
Scottish Power	1	8	8	40/–xd	+6d.	4 0 0
South London	1	7	7	35/6	—	3 19 0
Westminster Ordinary	1	7	7	34/6	+6d.	4 1 2
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	22/–xd	+9d.	6 16 4
Yorkshire Elec.	1	8	8	46/3	—	3 9 1

Public Boards.

		Dividend. 1932.	Dividend. 1933.	Price. Sept. 25.	Rise or Fall.	Yield p.c. £ s. d.
Central Electricity, 1950–70 ...	Stock	5	5	115	—	4 7 0
Do. 1955–75 ...	„	5	5	116	—	4 4 9
Do. 1951–73 ...	„	4½	4½	110	—	4 1 10
Do. 1963–93 ...	„	—	3½	101	—	3 9 4
London & Home Counties, 1955–75	„	4½	4½	110	—	4 1 10
London Passenger Transport, A...	„	—	4½	121½	+½	3 14 0
Do. do. B...	„	—	5	126	—	3 19 4
Do. do. C...	„	—	3	82	+1	3 13 2
West Midlands Joint Elec. 1948–68	„	—	5	113	—	4 8 6

Telegraph and Telephones.

		Dividend. 1932.	Dividend. 1933.	Price. Sept. 25.	Rise or Fall.	Yield p.c. £ s. d.
American Tel. & Tel.	$100	9	9	111½xd	+2	8 1 5
Anglo-Am. Tel. Pref.	Stock	6	6	112	—	5 7 2
Do. Def.	„	1½	1½	27	—	5 11 1
Cables & Wireless 5½% Pref. ...	„	2¾	2¾	77½	+3½	3 11 0
Do. A. 7½% Ord.	„	Nil	Nil	18	+2	—
Do. B. Ord.	„	Nil	Nil	8½	+½	—
Globe Tel. and T. Ord.	10	Nil	2½	9¾	+¾	2 10 8
Do. do. Pref.	10	6	6	12½	—	4 16 0
Great Northern Tel.	10	20	20	37	—	5 8 1
Marconi-Marine	1	10	7½	32/6	+⅛	4 12 4
Oriental Telephone Ord.	1	12	12	3⅞	—	*3 15 3

Home and Foreign Trams, Etc.

		Dividend. 1932.	Dividend. 1933.	Price. Sept. 25.	Rise or Fall.	Yield p.c. £ s. d.
Anglo-Arg. Trams First Pref. ...	5	Nil	Nil	1/6	—	—
Do. do. 2nd Pref.	5	Nil	Nil	1/6	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	7½	+2	—
British Electric Traction Df. Ord.	„	5	5	735	+50	—
Do. do. Pref. Ord.	„	8	8	162½	+2	4 18 8
Brazil Traction	100	—	—	11¾	+¼	—
Brit. Columbia Elec. Rly. Pce. ...	Stock	5	5	105	—	4 15 3
Mexico Trams, 5% Bonds ...	—	5	5	17½	—	—
Mexican Light Common	100	Nil	Nil	2½	—	—
Do. 7% Pref.	100	7	7	4½	—	—
Do. 1st Bonds	—	5	5	35	—	—
Victoria Falls Ord.	1	15	20	6½	–¼	3 4 0
Yorkshire (West Riding) ...	1	2½	5	25/–	—	4 0 0

Manufacturing Companies.

		Dividend. 1932.	Dividend. 1933.	Price. Sept. 25.	Rise or Fall.	Yield p.c. £ s. d.
Aron Electricity Ord.	1	10	10	3¼	+¼	3 1 6
Assoc. Elec. Ord.	1	4	3	22/–	+6d.	2 14 7
Do. Prf.	1	8	8	32/6	—	4 18 6
Babcock & Wilcox	1	9	6	43/0	–6d.	2 16 0
British Aluminium Ord.	1	5	5	29/–	–3d.	3 9 0
British Insulated Ord.	1	15	15	73/6	—	4 1 3
Brush Ord.	Stock	Nil	Nil	33	—	—
Callender's...	1	15	15	3¾	—	4 12 4
Do. 6½% Pref.	1	6½	6½	31/3	—	4 3 2
Crompton Parkinson Ord. ...	5/–	22½	12½	27/6	+6d.	4 11 0
Do. 8% Pref.	1	8	8	33/9	—	4 14 10
Edison-Swan 1st Pref.	1	7½	7½	22/6	—	6 13 4
Do. 5% Deb.	Stock	5	5	107½	—	4 13 0
Electric Construction	1	Nil	Nil	13/9	—	—
Enfield Cable Ord.	1	25	20	87/6	—	4 11 1
English Electric	1	Nil	Nil	5/9	—	—
Do. do. Pref.	1	Nil	Nil	11/3	—	—
Ever Ready	5/–	*35	35	27/6	—	6 7 3
Ferranti Pref.	1	7	7	27/–	+6d.	5 8 8
G.E.C. Pref.	1	6½	6½	32/6	—	4 0 0
Do. Ord.	1	8	8	40/3	—	3 9 3
Henley's	1	30	30	6½	+¼	4 16 0
Do. 4½% Pref.	5	4½	4½	5½	—	4 1 9
India-Rubber Preferred	1	—	—	18/9	—	—
Johnson & Phillips	1	5	5	27/6	+⅛	3 12 9
Siemens Ord.	1	6½	4	18/9	—	4 5 4
Telegraph Construction	£1	Nil	Nil	1	—	—

* Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings will be taken.

1932

29447. "Electrical propulsion of ships." General Electric Co., Ltd., C. C. Garrard, and H. J. Coates. November 21st, 1932. (415698.)

36840. "Insulating-bases of circuit-breakers, switches and the like, and terminals and other attachments for such bases. J. A. Crabtree. December 30th, 1932. (415746.)

36883. "Mercury-arc rectifiers." Westinghouse Electric & Manufacturing Co. January 28th, 1932. (415802.)

1933

2332. "Electric clocks." Muirhead & Co., Ltd., and F. H. Muirhead. January 24th, 1933. (415758.)

2452. "Radio-receiving systems." A. L. M. Sowerby and A. C. Cossor, Ltd. January 25th, 1933. (415729.)

2678. "Electro-magnetically operatable apparatus for recording periods of operation of machines and other mechanisms." Fabriques des Montres Zenith. August 9th, 1932. (Addition to 391976.) (415730.)

2754. "Electric generator units for internal-combustion engines.' Bendix Aviation Corporation. January 30th, 1932. (415704.)

2950. "Automatic circuit-breakers." J. A. Crabtree. January 31st, 1933. (Cognate application 12480/33.) (415750.)

2978. "Electrical condensers." Dubilier Condenser Co. (1925), Ltd. February 3rd, 1932. (415751.)

3149. "Magneto-electric machines." W. Bradford. February 1st, 1933. (415761.)

5908. "Television and like systems and apparatus." J. L. Baird & Baird Television, Ltd. February 27th, 1933. (Cognate application 15737/33.) (415744.)

5945. "Systems for giving audible indications to telephone subscribers." N. Marzi. February 26th, 1932. (415706.)

6106. "Vacuum electric discharge tubes." F. E. Bancroft and Associated Electrical Industries, Ltd. February 28th, 1933. (415709.)

6107/9. "X-ray tubes." F. E. Bancroft, T. E. Allibone and Associated Electrical Industries. February 28th, 1933. (415710/2.)

6108. "X-ray tubes." F. E. Bancroft, C. Sykes, H. Smethurst, and Associated Electrical Industries, Ltd. February 28th, 1933. (415711.)

6126. "Protective or safety devices for electrically propelled vehicles." General Electric Co., Ltd., and E. H. Croft. February 28th, 1933. (415713.)

6134. "Condensers suitable for use in high-frequency radio and similar circuits." Marconi's Wireless Telegraph Co., Ltd., and E. B. Moullin. February 28th, 1933. (415745.)

6135. "Thermionic oscillation generators." Marconi's Wireless Telegraph Co., Ltd., and E. B. Moullin. February 28th, 1933. (415716.)

6143. "Echo suppressors or other similar blocking arrangements for telephone and like transmission systems." Telefonaktiebolaget L. M. Ericsson and T. Laurent. February 28th, 1933. (415717.)

6148. "Prepayment mechanism for electricity, gas, and like meters." E. Cowan and Measurement, Ltd. February 28th, 1933. (415735.)

6152. "Process and apparatus for sheathing heavy current and light current electric cables with aluminium and its alloys." W. Gotzl. February 28th, 1933. (415719.)

6227. "Alternating-current transmission systems such as telephone systems incorporating echo suppressors." L. E. Ryall. March 1st, 1933. (415767.)

6241. "Selector mechanism for telegraph and like selective apparatus." Creed & Co., Ltd. July 8th, 1932. (415768.)

6266. "Electric circuit arrangements suitable for use in connection with photo-electric cells." Marconi's Wireless Telegraph Co., Ltd., and E. W. B. Gill. March 1st, 1933. (415771.)

6416. "Electrostatic machines." British Thomson-Houston Co., Ltd. March 2nd, 1932. (415777.)

6464. "Electrical remote-control systems." Standard Telephones & Cables, Ltd., and A. H. Roche. March 3rd, 1933. (415783.)

6465. "Aeroplane landing system employing radiated beams of electromagnetic energy." C. Lorenz Akt.-Ges. November 29th, 1932. (415784.)

6470. "Electrical conductors." A. E. Broue. March 3rd, 1933. (415785.)

6494. "Remote-control systems." Westinghouse Brake & Saxby Signal Co., Ltd. March 23rd, 1932. (415787.)

6558. "Dynamo-electric machines." R. B. Pullin & Co., Ltd., and C. G. Pengelly. March 3rd, 1933. (415794.)

6565. "Thermionic valve amplifiers and circuits therefor." J. C. Wilson and Baird Television, Ltd. March 3rd, 1933. (415796.)

6709. "Thermionic oscillation generators." Marconi's Wireless Telegraph Co., Ltd., and H. J. H. Wassell. March 6th, 1933. (415804.)

7145. "Electric lampholders." R. Nettl. March 19th, 1933. (415816.)

7307. "Electrical fuse switches of the pull-down type." Allen-West & Co., Ltd., and S. C. Smith. March 10th, 1933. (415818.)

7523. "Thermostatic electric switches." R. V. Grover and Drayton Regulator & Instrument Co., Ltd. March 13th, 1933. (415824.)

8707. "Short-time electric switches." General Electric Co., Ltd., H. C. Turner and A. Sherwin. March 23rd, 1933. (415834.)

9354. "Protective arrangements for electric power feeder systems." Pirelli-General Cable Works, Ltd., and H. T. Werren. March 28th, 1933. (415839.)

12195. "Automatically operated traffic-control systems." F. Von Opel. April 26th, 1932. (Cognate applications, 12196/33, 12197/33, and 12198/33.) (415852.)

12266. "Single-phase capacitor-type induction motors." English Electric Co., Ltd., L. Roberts, and R. D. Ball. April 27th, 1933. (415853.)

12507. "Radio-receiving apparatus." E. K. Cole, Ltd., and G. Bradfield. April 29th, 1933. (415856.)

14107. "Bayonet-joint locking devices for electric lamp holders." J. Etchells and Associated Electrical Industries, Ltd. May 15th, 1933. (415861.)

14235. "Electrical water-heating apparatus." Revo Electric Co., Ltd., and F. H. Reeves. May 17th, 1933. (415863.)

15959. "Electrical plug for use in radio receivers." J. Bate & Co., Ltd., and S. N. Fisher. June 2nd, 1933. (415867.)

24858. "Vaporising attachments for electric lamp bulbs." C. F. Schuh. September 13th, 1932. (415890.)

25696. "Traffic-control systems." F. Von Opel. September 17th, 1932. (Cognate application 25697/33.) (415893.)

25823. "Electrically heated receptacles." L. Cristiani and G. Mascarini. September 18th, 1933. (Convention date not granted.) (415895.)

29083. "Heating elements for electric heating and cooking appliances." Siemens-Schuckertwerke Akt.Ges. October 20th, 1932. (Cognate application 29084/33.) (415902.)

31968. "Electrical heating apparatus." Dispersion Cathodique (En Abrege Disca Soc. Anon.). November 17th, 1932. (415912.)

34342. "Protective systems for electric power lines." Siemens-Schuckertwerke Akt.-Ges. December 6th, 1932. (415926.)

35779. "High-voltage electrical plant." G. M. Pestarini. January 23rd, 1933. (Cognate applications 35411/33 and 35780/33.) (Divided application on 415701.) (415720.)

1934

4485. "Means for altering the timing of electrical impulses, more particularly for the grid control of vapour-arc rectifiers." English Electric Co., Ltd., J. E. Calverley and R. D. Ball. March 2nd, 1933. (Divided application on 6389/33.) (415799.)

6234. "Mercury and other conducting liquid electric switches." Siemens-Schuckertwerke Akt.-Ges. March 1st, 1933. (415737.)

7293. "Radio-receiving sets." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. April 29th, 1933. (415962.)

11676. "Draw-out types of electric switchgear." English Electric Co., Ltd., and A. A. Heath. April 18th, 1934. (415982.)

12334. "Intermittent current generators." British Thomson-Houston Co., Ltd. April 25th, 1933. (415983.)

12345. "Insulation of contacts and terminals in electrical fittings." F. L. Cook. November 6th, 1933. (415984.)

12768. "Turbo-generators." British Thomson-Houston Co., Ltd. April 28th, 1933. (415986.)

17803. "X-ray tubes." F. E. Bancroft, T. E. Allibone and Associated Electrical Industries, Ltd. February 28th, 1933. (Divided application on 415710.) (415722.)

17804. "X-ray tubes." F. E. Bancroft, T. E. Allibone and Associated Electrical Industries, Ltd. February 28th, 1933. (Divided application on 415710.) (415723.)

17805. "X-ray tubes." F. E. Bancroft and T. E. Allibone and Associated Electrical Industries, Ltd. February 28th, 1933. (Divided application on 415710. (415724.)

18953. "Miners' and like safety lamps." E. A. Hailwood. November 28th, 1932. (Divided application on 33573/32.) (415725.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from September 19th:—

Perfex. No. 550895. Class 6. Electric machines for drying the air.—I. Calvete, Ltd., 59-61, North Street, Clapham, S.W.4.

Meco. No. 544110. Class 13. Electric irons, kettles and soldering irons.—Mitchell Electric Co., Ltd., University Building, 5, Edmund Street, Birmingham.

The Overhead Lines Association

THE final meeting of the Overhead Lines Association (whose work is to be carried on by the new Transmission Section of the Institution of Electrical Engineers) was held at the Institution on September 19th. On the motion of Mr. W. Fennell (hon. treasurer and a past president), seconded by Mr. Jocelyn Swan (past president), a resolution was carried to the effect that the Association should cease its technical functions from that date and should be wound up.

Another resolution, proposed by Mr. A. Lennox Stanton (past president) and seconded by Mr. Herford, was passed that a sum of £25 be paid to the I.E.E. Benevolent Fund and that the remainder of the funds of the Association after all its commitments were met should be handed over to the Institution to form the nucleus of a fund to provide a premium for award each year to the author of the best paper (either in London or in the Provinces) read before the Transmission Section, relating to overhead lines and rural electrification. It was proposed that it be called "The Overhead Lines Association Premium" or "The Overhead Lines Premium."

In a historical survey of the work of the Association since its inception in August, 1927, credit was given by several speakers to the support received from the ELECTRICAL REVIEW and to the interest shown in its promotion by the late Mr. A. H. Allen, its technical editor. The reasons for the merger were the need for more office accommodation and clerical assistance for carrying on the aims of the Association.

It was announced that, of the twelve members who would serve as the committee of the new Transmission Section of the Institution, eight would be appointed by the Overhead Lines Association. They were: Major T. Rich, Mr. J. L. Eve, Mr. W. Fennell, Mr. Handley, Mr. R. Borlase Matthews, Mr. C. F. Mounsdon, Mr. Jocelyn Swan, and Mr. W. A. Turnbull.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Ashby-de-la-Zouch.—Houses (28), Burton Road; C. H. Clarke, builder, Eastwood, Notts.

Ayrshire.—Extensions, Dalmellington Higher Grade School (£6,830), for County E.C.; director of education, Ayr.

Baldock (HERTS).—Houses (300), London Road, for H. Gentle.

Barnsley.—Houses (29), Limesway, Gawber Road; Dobson & Co., Ltd. Houses (22), Wombwell Lane, Stairfoot; R. G. Micklethwait. Works extensions, Queen's Road; Ceag, Ltd. Houses (170), Mount Vernon; borough surveyor.

Bedford.—Houses (92), Stewartby, for the London Brick Co. & Forders, Ltd.

Bexhill-on-Sea.—Entertainments hall, Coastguard site (£81,032); Rice & Son, Ltd.

Bexley.—Station, Claremont Park, for the Southern Railway Co., Ltd.; chief engineer.

Birmingham.—Block of shops, Warwick Road, Acocks Green; Harford, Kingham & Nock, architects, Colmore Row. Stores, Shirley Road, Acock's Green, for F. W. Woolworth & Co., Ltd. (£15,000); own building department.

Bishop's Stortford.—Houses (38), London Road; U.D.C. surveyor.

Blaydon-on-Tyne.—Houses (300), Winlaton Village; N. Barker, builder, Winlaton Mill.

Blyth.—Addition to secondary schools; L. Leeper, borough engineer, Town Hall.

Bolton.—Shops and arcade, Bradshawgate; borough surveyor. Town Hall.

Bradford (YORKSHIRE).—Branch public library, 12, St. Andrew's Villas; J. A. Fletcher, city architect, Town Hall.

Bromley.—School, George Lane, Hayes, for Borough E.C.; director of education. Houses (154); A. McClelland & Co. Houses (49); H. F. Thorburn, Ltd. Houses (92); Hayes, Henry Boot (Garden Estate), Ltd.

Buckinghamshire.—School, Bletchley, for County E.C.; D. E. Cooke, secretary, Aylesbury.

Burnley.—Houses (30), Morse Street and Rennie Street; A. Luty, Moore Street. Houses (28), Westbourne Avenue; Russell Bros., Wades House Road, Nelson.

Bury St. Edmund's.—Senior school (880 places), for Borough E.C.; Naish & Mitchell, architects, 8, Hatter Street.

Caine.—Houses (24) and bungalows; borough surveyor.

Cannock.—Senior boys' and girls' school, Littleworth, for E.C.

Chatham.—Houses (44); W. T. Davis & Son, Ltd., builders.

Chester-le-Street.—Houses (67), Burnmoor; M. Wilson, housing architect, Council Offices.

Chigwell.—Town Hall (£9,408); F. Hutton & Son, builders.

Clarkston.—Houses (44); John Lawrence (Glasgow), Ltd., builders, 50, Wellington Street.

Coventry.—Factory, Fletchamstead Highway, for the Coventry Swaging Co., Ltd., Whitefriars Lane; W. H. Jones & Son, Ltd., builders, Lockhurst Lane. School, Wyken (£15,000), and additions to Moseley Avenue School (£7,750); H. H. Ford, city architect.

Dalbeattie.—Houses (18); burgh surveyor.

Darlington.—Houses (20), Brinkburn Avenue; Bussey & Armstrong, builders, Brinkburn.

Doncaster.—Houses (32); R.D.C. surveyor.

Dover.—Public library (£4,040); borough engineer.

Durham.—Infants' school, Stanley, for County E.C.; F. Willey, architect.

Edinburgh.—Offices, Dunedin Street, for the Albion Motors, Ltd.; T. Aikman Swan, architect, St. Colme Street.

Elstree.—Film studios for the London Film Productions, Ltd. (£300,000).

Essex.—Two schools, Hornchurch, for County E.C.; J. Stuart, county architect, Chelmsford.

Exeter.—Flats (24), Coombe Street area (£12,522); city architect. Enlargement to Ladysmith Road School, for E.C.

Faversham.—Hotel, Steple Street; Shepherd Neame & Co., Ltd.

Felling-on-Tyne.—Electric lighting to fifty-three houses; C. W. Hall, surveyor, Council Offices.

Fleetwood.—Entertainment hall, Marine Gardens (£24,250); borough surveyor.

Giffnock.—Houses (48); John Lawrence (Glasgow), Ltd., builders, 50, Wellington Street.

Glasgow.—Cinema, Duke Street, for Bernard Fruitin, theatre proprietor, 118, Stockwell Street; Lennox and McMath, architects, 103, Bath Street. Showroom and offices for Hunter's Garage, Ltd., Dumbarton Road; J. Paterson, architect, 23, Sussex Street.

Gourock.—Houses (58), Copper Mine Field, Larkfield Road; Alex. Duthie, burgh surveyor, Municipal Buildings.

Grimsby.—Post office, Cleethorpe Road; H.M. Office of Works. School, Carr Lane (£38,199); R. M. Phillips & Son, Ltd., Brigg. Hospital extension (£6,784); Wilkinson & Houghton, Ltd.

Halifax.—Factory, West Parade, for G. H. Gledhill & Sons, Ltd.; A. Pickles, architect, Hopwood Hall, 1, Lord Street.

Hemel Hempstead.—Church, King's Langley, for the Methodist trustees; secretary.

Hemsworth (YORKS).—Houses (100); R.D.C. surveyor.

Hereford.—School (320 places), Whitecross, for City E.C.; director of education.

High Wycombe.—Houses (28), Greaves Road; C. Jefferson & Son.

Hurlford (AYRSHIRE).—Houses (142), for C.C.; clerk, Ayr.

Isleworth.—Houses (60), Syon Lane Housing Estate; borough surveyor, Chiswick, London, W.

Kent.—School, Perry Street Road, Northfleet, for County E.C.

Lancashire.—Secondary school (£15,426), Eccles, for County E.C.; director of education, Preston.

Leicester.—Additional wing to Wyggeston Boys' School (£30,000); J. Miller, architect, 15, Blythewood Square, Glasgow.

London.—(ISLINGTON).—Bath enlargement, Twyford Street (£4,393); borough engineer. (STOKE NEWINGTON).—School, Amhurst Park; R. S. Morris. (TOTTENHAM).—Houses, Weir Hall Estate (£35,994); U.D.C. surveyor. Shops, Hermitage Road; Brooking Bros. Factory extension, Crown Road; E. Barber & Co. Factory extension, 17, South Grove; G. Sonneborn & Co., Ltd. (WESTMINSTER).—Sports arena (£1,000,000), Grosvenor Road, for Lonsdale Arena and London Properties, Ltd.; Nevill Hampson, architect.

Lowestoft.—Development of Waveney Drive Estate; J. A. Gaze & Sons. Bus station, Battery Green (£3,884); borough engineer.

Luton.—Houses (24); C. C. Smith, builder. Houses (27), Blundell Road, for C. C. Smith.

Lymington.—Houses (109); borough surveyor.

Maldon.—Cinema, High Street, for Shipman & King.

Manchester.—Houses (74), Barley Avenue, Myerscough Close and Nuthurst Road, Broadway, Moston, and 36 houses, East Street, Newton Heath, for the North Manchester Newton Heath, Ltd., 2, Monsall Road, Newton Heath. Houses (58), Hallam Road and Moore Street, Newton Heath; Provincial Estates (Blackpool), Ltd., Queen Street, Blackpool. Houses (38), St. Mary's Road, Clapham Street, Minton Street, Wireworks Street, and Dresden Street, Moston; W. A. Luty, builder, 46, Endsleigh Gardens, Blackpool. Houses (72) and shops, Kingsway, and Burnage Lane, East Didsbury; B. B. Bender, builder, 31, Great Clowes Street, Broughton, Manchester.

Mountain Ash (GLAMORGANSHIRE).—Electricity showroom, offices and stores, &c.; W. H. Williams, architect, Town Hall.

Northern Ireland.—(BELFAST).—Houses, Bawnmore Road, for Mrs. M. Meeke; H. Gault, architect. Houses (28), Onslow Parade, for Joseph McMaster; T. Guthrie, architect.

Oundle.—Houses, Benefield Road, electrical work; U.D.C. surveyor.

Paignton.—Houses (10), Knapp Park Road; F. G. Stockman.

Preston.—R.C. Chapel (£4,500); F. Healey, builder, Market Street.

Richmond (SURREY).—Houses (66), North Parade and Lychett Terrace; borough engineer. Rebuilding factory, Medina Wharf, Kew; C. Wise.

Rochester.—Factory, for Pobjoy, Ltd., Hooton, Wirral, Cheshire.

Rugeley.—Houses (50); C. Mason & Sons, builders.

St. Albans.—Houses (37); J. Gerrard & Sons, Ltd., builders.

St. Ives (HUNTS).—Houses (34), Needlingworth Road; H. E. Lavender, Son & Close, architects, 65, Bridge Street, Walsall.

Shrewsbury.—Rebuilding premises of T. Sidoli, corner of Princess Street and Peacocks Passage; A. G. Chant, architect, 5, Belmont.

Solihull.—Development of Shakespeare Manor Estate; H. & R. (Developments), Ltd.

Southampton.—Houses (238), Coxford Housing Estate; borough engineer.

Southend-on-Sea.—Swimming baths, &c., Westcliff (£140,000); borough surveyor.

Southport.—Church, Lord Street West, for Trustees of the Church of Christ Scientist; A. England, Charlton Chambers, St. Andrew's Road, South, St. Annes-on-Sea.

Stamford.—Houses (41), Cemetery Road site; F. R. Ryman, borough engineer.

Stockport.—Public Elementary School, Garners Lane, Adswood, for E.C.; Daniel Eadie & Co., Ltd., builders, Short Street, Heaton Norris.

Stockton-on-Tees.—Secondary school, Oxbridge Avenue; F. Willey, architect, 34, Old Elvet, Durham.

Stowmarket.—Houses (60); U.D.C. surveyor.

Stroud.—Houses (52); R.D.C. surveyor.

Suffolk.—Additions to the Bungay Grammar School, Ipswich; county architect, County Hall, Ipswich.

Sunderland.—Houses (186), on the Ford Estate; L. W. Evans, builder, 29, Coniscliffe Road, Darlington. Houses, Silksworth Lane; W. & T. R. Milburn, architects, 17, Fawcett Street. Maternity block to the Municipal Hospital (£12,000); T. P. Collinge, borough engineer.

Swanscombe (KENT).—Houses (65); U.D.C. surveyor.

Swansea.—Houses (19), Clyne Common; H. W. Williams, Newton. Houses (22), Cwmgwyn; A. E. Wright. Houses (22), Llangyfelach Road; R. N. K. Colley. Houses (28), Townhill Road; S. Davies.

Tonbridge.—Factory, the Botany, for Distillers Co., Ltd., Burgh Heath, near Epsom.

Twickenham.—Senior school (£30,650), for E.C.; director of education.

Warrington.—Houses (40), Orford Road; R. Smith. Houses (44), Thelwall Lane; borough engineer. Premises, Owen Street; McArthur & Beattie.

Warwickshire.—New schools (£71,300); county architect, Warwick.

Welling (KENT).—Church, for the Methodist trustees; Rev. W. Robinson.

West Riding.—School, Listerdale (£10,500); for County E.C.; education architect, Wakefield.

Weston-super-Mare.—Houses (106), Bournville Estate; Read (Contractors), Ltd., builders.

Wilton.—Houses (24), the Hollows; Bothams & Brown, architects, Chipper Lane, Salisbury.

Winsford (CHESHIRE).—Houses (40); U.D.C. surveyor.

Wolverhampton.—Houses (26), Marsh Lane; Bushbury Estate & Building Co., Ltd. Houses (60), Marston Estate; Marston, Fellows, Ltd. Works extension, Monmore Common; Steelway, Ltd.

Wonerash.—Estate development of Barnet Hill; A. Parsons, Bramley, Surrey.

Worcestershire.—Extensions to County Buildings, for C.C.; A. V. Rowe, county architect, Worcester.